

SHORT CORRECTIONS
CHAPTER 5

**KING SOUND AND APPROACHES—ADELE ISLAND—BUCCANEER ARCHIPELAGO AND COAST
WESTWARD TO CAPE LEVEQUE**

5-1 General remarks.—Adele Island and its surrounding dangers lie in the northern approach to King Sound, about 33 miles northward of the Buccaneer Archipelago, which group lies in the entrance to King Sound. Between is the channel leading to King Sound from the eastward, the greater portion of which has recently been surveyed, and described in the following pages. In the approaches to, and within King Sound, tidal ranges are considerable, particularly during spring tides. Tidal currents run with great strength in many places. The navigation must have careful regard for these tidal currents and have sufficient power in his vessel to negotiate narrow passages.

5-2 ADELE ISLAND ($15^{\circ}31' S.$, $123^{\circ}09' E.$, *H. O. Chart 3419*) lies 33 miles, 343° , from Caffarelli Island of the Buccaneer Archipelago. Shoals extend some 33 miles eastward of it, to within 20 miles of the reefs extending southwestward of the Champagny Islands, described at the end of the last chapter.

Adele Island, 8 feet in height, sandy, and the greater part covered with bushes and coarse grass, is about 2 miles in length, northwestward and southeastward, by 1,500 yards in breadth, and intersected by a creek.

The island is surrounded by a reef, dry at low water, extending 6 miles northward, 3.8 miles southward, 2.8 miles eastward, and 2.5 miles westward of it. Between the isle and the northern extremity of the reef is a sandy cay 1 foot high.

The water has a shallow appearance for about 10 miles westward of the northern extremity of the reef, and there is much uneven ground between Adele Island and Beagle Island to the northeastward.

A depth of 7 fathoms has been reported (1955) to lie about $5\frac{1}{2}$ miles north-northeast-

ward of Adele Island Light.

Foul ground extends 15 miles or more southward of the island, with depths of 11 to 12 fathoms; on this ridge is a patch of 5 fathoms bearing 155° distance 10.5 miles from the southern extremity of Adele Island. A rock, with a depth of less than 6 feet, was reported in 1954 in a position one mile off the surrounding reef and about $3\frac{3}{4}$ -miles west-southwestward of the light structure.

A light is shown from a steel framework structure, 111 feet high and painted red, near the northern extremity of Adele Island.

5-3 Churchill Reef, which dries 9 feet, lies about 5 miles eastward of Adele Island; it is about 5 miles in length, but its eastern limit has not been determined. There is a channel $1\frac{1}{2}$ miles wide between the island reef and Churchill Reef, with depths over 40 fathoms; its edges are marked by discolored water.

5-4 Albert Reef ($15^{\circ}37' S.$, $123^{\circ}20' E.$, *H. O. Chart 3419*) consists of two reefs together about 5 miles in extent; the southern dries 7 feet and the northern 4 feet; between Churchill Reef and the northern reef is a patch of $4\frac{1}{2}$ fathoms. The center of Albert Reef lies 117° , distant 11 miles from the southeastern point of Adele Island.

Between Albert Reef and Beagle Reef, 20 miles north-northeastward, are the South and North Breakers.

Mavis Reef, on which there is a sand cay which dries 20 feet, lies with its drying part about 10 miles south-southeastward of Beagle Reef. Three small reefs lie within 2 miles of its northwestern extremity, and a shoal, with depths of three-quarters of a fathom, lies within a half mile of its southeastern extremity. A shoal, with least depth of 4 fathoms, lies about 5 miles east-northeastward of the southern extremity of Mavis Reef.

5-5 Anchorage.—In Fraser Inlet, on the eastern side of Adele Island Reef, 3.5 miles northward of the island, there is secure anchorage in 12 fathoms over sand and coral. The entrance is very foul, and it should only be taken at low water, and then with the utmost caution and by those possessing local knowledge.

5-6 Tides.—It is high water, full and change, at Adele Island, at 12h. 0m.; springs rise 21 feet. The flood current sets to the southward and the ebb to the northward at the rate of $4\frac{1}{2}$ knots in the channel between Adele Island and Churchill Reef; westward of Adele the current runs eastward and westward at the rate of $2\frac{1}{2}$ knots, and in the channel between it and the Buccaneer Archipelago at about the same rate.

There are heavy tide rips over the foul ground, extending 8 miles southward of Adele Island Reef during the strength of the current.

Supplies.—Large numbers of turtle may be had in the vicinity of Adele Island, also a few fish may be obtained in Fraser Inlet.

5-7 Beagle Reef ($15^{\circ}19' S.$, $123^{\circ}30' E.$) lies $057^{\circ} 22$ miles from Adele Island; it is composed of white sand and dead coral and is covered at high water. The part which dries is about 1,000 yards in extent, is surrounded by a reef which extends 2.5 miles north-northwestward and 1 mile south-southeastward. Shoal water depths of 4 to 10 fathoms, extend about 3 miles northward, 5 miles eastward, and 4 miles southward of the bank which dries.

Dingo Reef, which dries 2 feet, lies about $4\frac{3}{4}$ miles eastward of the drying part of Beagle Reef, and Fox Shoal, with a depth of $3\frac{3}{4}$ fathoms, lies about $5\frac{1}{2}$ miles south-

eastward of Dingo Reef. A $4\frac{3}{4}$ -fathom patch lies nearly midway between these reefs.

Barcao Shoal, with a least depth of $2\frac{1}{4}$ fathoms, lies about 16 miles west-southwestward of Adele Island.

The greatest caution should be observed when in the vicinity of these dangers.

5-8 THE BUCCANEER ARCHIPELAGO (*H. O. Chart 3419*)—**General remarks.**

—The Buccaneer Archipelago, situated in the northeastern approach to King Sound, consists of numerous islands and rocks lying between $15^{\circ}51' S.$, $16^{\circ}20' S.$, and $123^{\circ}15' E.$, $123^{\circ}47' E.$ The archipelago may be said to consist of four separate chains of islands extending from the mainland in a north-westerly direction, the islands on each ridge being connected by coral reefs, drying at low water, with intricate channels through them. These channels are dangerous for small sailing vessels to navigate owing to the strong tidal currents forming violent rippings and whirlpools, and attaining a rate of from 6 to 10 knots in places.

5-9 Macleay Islands, connected by reefs, form the northeasternmost of these chains of islands, extending for a distance of 16 miles northward of Yampi Sound, eastern side of the eastern approach to King Sound.

5-10 King Islets ($15^{\circ}52' S.$, $123^{\circ}38' E.$), 52 and 62 feet high, the northwestern of the group, are situated on the western end of a reef 2.5 miles in extent; depths over 20 fathoms will be found at 800 yards westward of it. Rocks 22, 25, and 35 feet high lie near the eastern and southern extremities of the reef.

Conway Islet, 30 feet high, lies northward of the eastern part of King Islets Reef, on a reef 1,200 yards in extent, practically connected with the latter.

An islet, 14 feet high, is located close southeastward of Conway Islet.

Challis Rocks, the northeasternmost of the group, consists of a group of bare rocks, 11 feet high, situated on a reef 1.3 miles in length, at 1.8 miles eastward of King Islets Reef. Deep water will be found close eastward of Challis Rocks.

Scobell Rocks, 4 feet high, lie on a reef 1,800 yards in extent, and which dries 21 feet midway between the southeastern extremity of King Islets Reef and the largest Macleay Island.

5-11 Macleay Island, the largest island of the chain, is a flat-topped grassy island, 227 feet high, and 2.3 miles in length in a northern and southern direction; its western side is formed of steep cliffs, from 160 to 200 feet high. Near the northern end of the island is a salt-water lagoon nearly cutting the island in two.

Two small islets, 92 and 48 feet high, lie close off its southern end.

Landing may be effected on either of the two shingle beaches at its southern end. No water was found on the island.

Crabbe Islet, 80 feet high, lies 1,000 yards southward of Macleay Island, on the same reefs; it is steep to on its southern side.

Sweeney Patches, with a least depth of 8 fathoms, are situated on a bank 2 miles in length, within the 20-fathom curve, from 1.5 to 3.5 miles southeastward of Crabbe Islet. There are heavy tide rips over these patches during strong winds.

5-12 Gibbings Reefs, drying 3 feet at low-water springs, are two dangerous patches, 1.5 miles apart in an easterly and westerly direction. The eastern reef lies 087° 4.8 miles from the summit of Macleay Island; these reefs should be given a wide berth, as they are usually hard to distinguish. The water eastward of these reefs has not been examined.

Channel.—There is a clear channel 7 miles wide, with depths of 22 to 40 fathoms be-

tween the southern islet of the Macleay Group and Koolan Island off the mainland.

5-13 McIntyre Islet, 186 feet high, is the northwesternmost of the group, and situated 020° 2 miles from the northern extremity of Bathurst Island; reef extends 500 yards off its southern and southeastern sides, and to a less distance elsewhere.

A rock, awash, lies close off its eastern end. There is a clear channel between McIntyre Islet and Bathurst Island.

Lena Reef, which dries 1 foot at low-water springs, lies 319° 1,400 yards from McIntyre Islet. It breaks heavily with a northwest swell.

5-14 Bathurst Island lies close northward of Irvine Island. It is about 2.8 miles in length and 1,600 yards in breadth; its summit on the western side is 309 feet high, with steep cliffs falling from it to the water's edge. A rock, 17 feet high, is situated near the edge of the reef, extending for a distance of 900 yards from its northern extremity.

Rocks, 77 and 150 feet high, are situated on the reef which extends over 1 mile from the eastern side of the island, with a rock, 50 feet high, between the reef and Kathleen Island, and others as charted. A detached reef lies awash about three-fourths of a mile eastward of the southeastern extremity of Bathurst Island.

5-15 Irvine Island, 511 feet high, lies westward of Cockatoo Island, with the channel above described between them. It is 2.8 miles in length, north and south, and 2.3 miles in breadth. Two bays, both of which dry off at low water, lie on either side of its southeastern point. The island is covered with stunted gum trees and coarse grass.

Water.—There is a large water hole at the northwestern corner of the island, close above the water line, where probably there would be a supply at all seasons.

KATHLEEN ISLAND, 267 feet high, lies off the northeastern extremity of Irvine Island.

MOORE ISLET (Tanner), 54 feet high, lies near the southwestern side of Irvine Island. A LIGHT is shown from a concrete tower, 20 feet high, on the summit of Moore Islet.

FLORA ISLET, about 80 feet high, lies off the northwestern extremity.

A PATCH of reef, which dries 14 feet, lies about 500 yards off the western shore almost abreast the summit of Irvine Island.

5-16 COCKATOO ISLAND, the inner large island of this chain, is 3.2 miles long in a west-northwesterly and opposite direction and about 1,000 yards wide. Its summit near the center is 443 feet high; there is a conspicuous cone-shaped hill 179 feet high at its western extremity. A deep valley extends up the center of the island in an easterly direction.

WATER.—It was reported (1965) that there is no natural water supply on Cockatoo Island. The island's water needs are transported to the island and pumped ashore into 2 tanks with a total capacity of about 940,000 gallons.

A LIGHT BEACON, marking the southeastern extremity of a shoal with a least depth of 24 feet, stands in 33 feet of water about one-half of a mile offshore in a position about three-fourths of a mile southwestward of the summit of Cockatoo Island. A LIGHT is shown occasionally near the summit of the island and about 1/2 mile northwestward of the T-headed jetty.

A steel and concrete T-shaped JETTY, 700 feet long with a least depth of 28 1/2 feet alongside, is located on the central part of the southern side of the island about 3/4 mile northwestward of its southeastern point. Ships are loaded by a large electric steel boom and conveyor belts. The boom can be moved horizontally and vertically to cope with the tidal range. The tidal range is 25 to 35 feet. The settlement of about 200 people (1965) is clean and healthy. Medical facilities and a doctor are available. It was reported (1965) that a radio station of 10 watts operates on the island. The call sign is "VHK" on frequencies 2760, 4940, 5300, and 8300 kcs.

5-17 COLLINS COVE, which indents the coast about 200 feet, is located about 1 1/4 miles northwestward of the T-shaped jetty.

There is a small wharf situated on the northwestern side of the cove and two radio towers are situated on the north side. The small wharf is 112 feet in length and can only be used by small boats at high water. A crane with a 20-ton capacity is located on the wharf. A line of black can MOORING BUOYS is situated about one-half of a mile southwestward of the cove.

BLACK ROCK (16° 05' S., 123° 35' E.), 15 feet high, lies 800 yards off the western end of Cockatoo Island, with which it is connected by a reef, dry at low-water springs. A small reef, which dries 2 feet, lies 500 yards southward of Black Rock.

CHANNEL.—There is a clear channel with depths of more than 20 fathoms over a width of 600 yards between Black Rock and Irvine Island, the opposite points of which are steep-to.

5-18 ANCHORAGE.—Black Rock being passed at a distance of 500 yards on the port hand when entering from the northward will lead through this channel to good anchorage off the southwestern side of Cockatoo Island, off which a bank, with depths of 4 to 10 fathoms, extends for a distance of 1.3 miles, the bottom being mud and coral.

Vessels of moderate draft may anchor at a distance of 500 yards from the shore, in 6 1/2 fathoms, mud bottom, with Black Rock bearing 337° just open of the western extremity of Cockatoo Island, and the southern extremity of that island bearing 112°.

The TIDAL CURRENTS attain a rate from 1 to 2 knots in the vicinity of the anchorages. The flood currents set eastward and the ebb currents set westward.

USBORNE ISLE, 182 feet high, lies close off the eastern end of Cockatoo Island, to which it is connected at low water by a coral ridge. It has steep cliffs on its southern side, and its eastern point is steep-to, forming the western side of entrance to Yampi Sound.

5-19 YAMPI SOUND (H.O. Chart 3419) lies between Cockatoo Island and Koolan Island on the north and the mainland on the south. Its shores are rocky, with numerous coves. The coast ridge, which is from 500 to 600 feet high, is sterile, a few stunted gum trees and low scrub being the only vegetation

visible, and the interior has scarcely a more fertile appearance.

A first port of entry (sec. 1-18) encompasses Yampi Sound. The limits of the port extend from a position in $16^{\circ}13'13''$ S., $123^{\circ}32'32''$ E. northward 10 miles to a position between Bathurst Island and Irvine Island; thence eastward 15 miles; thence southward to the mainland. The southern limit includes the coastline between the western and eastern limits.

5-20 PARAKEET CHANNEL, the entrance to Yampi Sound, is between Tarrant Isle, off Koolan Island and Usborne Island off Cockatoo Island, and is 1.5 miles wide with deep water, excepting Comber Rock, awash at low water, and situated right in the center of the fairway. It is steep-to with a channel on either side of it, and it is marked by a light.

THE PICCANINNIES, are a group of rocks and shoals which lie near the center of Yampi Sound, about $3/4$ mile southward of the southern extremity of Cockatoo Island. The eastern of these rocks, 82 feet high, surrounded by reef, lies on the northern side of the fairway within Comber Rock, bearing 224° 1 mile from the eastern extremity of Usborne Island.

Two similar rocks, 64 and 44 feet high, lie about 1,700 yards west-southwestward of the above.

A detached reef, which dries 8 feet, lies close southward of the reef surrounding these rocks.

A shoal with a depth of $5\frac{3}{4}$ fathoms is located on the southern side of the channel in a position about $1\frac{3}{4}$ miles west-northwestward of Woodhouse Point.

5-21 DIRECTIONS.—Vessels approaching Yampi Sound from the northeastward may safely use Parakeet Channel, by passing either Tarrant or Usborne Islands at a distance of about 400 yards, thus avoiding Comber Rock. Small vessels with thorough local knowledge proceed to King Sound along the southern shore, passing down westward of Margaret Island and between the island and shoals southward of, and through Whirlpool Pass into the sound.

Whirlpool Pass is only navigable at slack water, but no stranger would be justified in using it.

Vessels from the westward enter between Bathurst and Irvine Islands, on the northward, and Admiral, Powerful, and Gibbings Islands on the southward, this channel being free from hidden dangers; a mid-channel course should be taken. This applies also to vessels bound westward from Yampi Sound, northward of Caffarelli Islands, etc.

ANCHORAGE.—Good anchorage will be found in all weathers in Yampi Sound, in 8 fathoms, mud bottom, with the eastern extremity of Tarrant Islet bearing 341° , and the northern extremity of Nares Point 100° . The tidal current at this anchorage is slight, a maximum strength of 1 knot being found here at springs.

5-22 KOOLAN ISLAND, 670 feet high, near its center, is 7 miles long in an easterly and westerly direction, with a maximum breadth of 3 miles at its eastern end, tapering to the westward. The island forms the northern side of Yampi Sound and is separated from the mainland by The Canal.

A cargo wharf, with a face 560 feet long, and having depths of 45 feet alongside, extends from the island. A crane with a capacity of 33 tons is located on the wharf. Vessels can tie up alongside in most any kind of weather.

Water is obtainable at most seasons of the year from a pool at the head of a small bay at the eastern end of the island; these pools, however, dry up about October.

SANDERS POINT ($16^{\circ}07'$ S., $123^{\circ}47'$ E., H.O. Chart 3419), the northeastern extremity of Koolan Island, is 400 feet high.

5-23 ROBERTS ISLET, 196 feet high, lies 500 yards off the western extremity of Sanders Point, with another islet, 109 feet high, westward of it, between which is a rock which dries 1 foot; both are covered with scrub, and are steep-to on their northern side.

There are large deposits of ironstone on Koolan, Cockatoo, and Irvine Islands; a company commenced working them in 1911.

TARRANT ISLET, which is 233 feet high, lies off the western end of Koolan Island and is connected to it by a drying reef. The island is 1,000 yards long in an easterly and westerly direction and 200 yards wide. On its

(1535) AUSTRALIA—Northwest coast—Yampi Sound—The Canal—Lights established—Jetty information.—1. The following lights have been established as indicated:

(a) *Qk. Fl. G. 2 M.* on the northernmost extremity of Nares Point ($16^{\circ}08.0'$ S., $123^{\circ}42.5'$ E. approx.).

(b) *Qk. Fl. R. 1 M.* on Koolan Island about 1.8 miles 100° from (a).

(c) Range Front Light *F.*, about 2.6 miles 111° from (a).

(d) Range Rear Light *F.*, about 940 yards 119° from (c).

2. A jetty exists about 0.2 mile southeast of (1b).

(N.M. 10/66.)

(N.M. 5(55), Sydney, 1966.)

H.O. Chart 3419.

H.O. Pub. 111B, 16583, 16585, 16587, 16587.1.

H.O. Pub. 74, 1952, page 177.

northern side it is bare and rocky with steep cliffs.

5-24 The Canal is the passage 1,200 yards wide at its western end, separating Koolan Island from the main. It narrows considerably toward its eastern end, and forms a dangerous channel, through which the tidal currents run with great velocity.

Nares Point ($16^{\circ}08' S.$, $123^{\circ}42' E.$), the southern point of entrance to The Canal, is 233 feet in height, rising within.

A reef, which dries 4 feet, lies 232° 1,650 yards from Nares Point; between this reef and the point abreast, 124 feet high, are other reefs.

The bights on either side of this point afford good anchorage for small craft. From the head of the western bight Silver Gull Creek extends about a mile south-southeastward and thence almost a mile northeastward; fresh water may be obtained from a spring in the creek. At spring tides vessels with local knowledge and drawing not more than 9 feet can enter the creek from about half flood to half ebb.

Margaret Island, with a bare cone summit, 313 feet high, lies 6.8 miles westward of Nares Point and close to the mainland.

Woodhouse Point, its northeastern extremity, is the western point of approach to Yampi Sound. A reef, which dries 18 feet, extends 700 yards northward from the point.

Inlet.—At 2 miles east-southeastward of Woodhouse Point is an inlet 2 miles in length by 500 yards in breadth, with a depth of 2 fathoms in its center. Pearling craft could find excellent shelter here in the cyclone season. It ends in a mangrove swamp.

5-25 Coast.—Southwestward of Margaret Island the coast forms an inlet 2 miles in length. At 1.5 miles up the depth shoals to $3\frac{1}{2}$ fathoms, and its head is lined with mangroves. About $1\frac{3}{4}$ miles within the inlet is an island which is separated from the mainland northeastward by a narrow pass which is reported to be deep and clear. Ves-

sels of moderate size can obtain anchorage about $1\frac{1}{4}$ miles within the entrance to this inlet.

The western side of the entrance is a point 269 feet high, and at about 1 mile to the westward is a point 218 feet high, with a bight dry at low water between them. Two rocks which dry 20 feet lie within 1 mile northwestward of the point 218 feet high. From the same point the coast trends very irregularly 5.5 miles to Whirlpool Pass, fronted by a network of islands and reefs extending more than half way to Bayliss Islands; these are mentioned with those islands.

Two inlets indent this coast, at 1, 4, and 5 miles southward of Margaret Island, terminating in mangrove swamps.

From Whirlpool Pass the coast trends southeastward for 8 miles to Strickland Bay, the eastern shore of King Sound.

Water.—Water is always obtainable from a stream at the head of the inlet, the entrance of which lies 1 mile south of Woodhouse Point. At high-water neaps a vessel of 9-foot draft may approach within a mile of this stream.

5-26 The western group of the Buccaneer Archipelago consists of numerous islands and islets mostly connected by reef at low water. Toward high water the tidal currents run with considerable velocity between these islands, making the passages dangerous for small craft.

5-27 Caffarelli Island ($16^{\circ}02' S.$, $123^{\circ}17' E.$, *H. O. Chart 3419*), the outer and westernmost of this chain, is 2.5 miles long in an east and west direction, with an extreme width of 1,400 yards. It is rocky, from 160 to 207 feet high, and its surface is covered with coarse grass and scrub. The coast is broken up into several bights fringed with dense mangroves. No water was found on the island. The southern coast is steep-to,

but the northern is fringed by reef with rocks on it, one being 53 feet high.

An islet, 120 feet high, lies on the edge of the reef which extends westward from the western extremity of Caffarelli Island.

Thornbury Reef, which dries 4 feet, lies 280° 1.3 miles off the above islet; it is of small extent and steep-to, and can usually be discerned by the tidal eddies around it.

There is a clear deep channel between this reef and the islet.

5-28 Cleft Islet, 2 miles eastward of Caffarelli Island, the highest of a group of five islets on the same coral reef, is one of the most conspicuous of the archipelago. It is a bare cone, 184 feet high, and is split in two by a chasm, and is steep-to on its northern and western sides; the other four islets are from 80 to 150 feet high.

A rocky islet, 25 feet high, lies 1,000 yards westward of Cleft Islet, with deep water at the distance of 200 yards all round it. Reefs drying from 18 to 20 feet lie between it and Caffarelli Island.

Barrett Rock, 1 foot high, lies 150° 1.8 miles from the eastern extremity of Caffarelli Island. It is surrounded by reef to the distance of 500 yards, with a small detached reef, which dries 2 feet, at 200 yards off its western side.

5-29 Channel.—Craft from the northward using the channel between Caffarelli Island and Cleft Islet should pass within 400 yards of either side of the 25 feet high islet on a 189° course until the eastern extremity of Caffarelli Island bears 291° , then alter course to pass within 1,000 yards of Caffarelli Island, thus avoiding the reef of Barrett Rock. This passage is not recommended for strangers.

5-30 Fraser, Admiral, King Hall, and Bruen Islands.—Fraser Island, 250 feet high; Admiral Island, 276 feet high; King Hall Island, 275 feet high; and Bruen Island, 206

feet high, with five islets, all connected by a coral reef dry at low water, form a group extending from 2 to 7 miles eastward of Caffarelli Island. They are mostly flat topped and covered with scrub.

Longitude Islet, 25 feet high, named from its position having been accurately determined in 1891, lies close off the northern side of Admiral Island.

A reef, which dries 23 feet, lies 600 yards off the northern side of Admiral Island, midway between Longitude Island and the southeastern extremity of the reef of Cleft Island Group.

Rocks 49 and 60 feet high lie on the reefs eastward of Longitude Islet.

Bowles Rock, 2 feet high, lies on a reef 700 yards in extent, 098° 4.2 miles from Cleft Islet. It forms the outer danger on the southern side of approach to Yampi Sound from the westward.

5-31 Powerful Island, 300 feet high, is a flat-topped island 2.5 miles long, northward and southward, and much indented on its eastern side, and off which are several islets and reefs. Its summit is immediately over Ram Point, its southwestern extremity, from which steep cliffs fall to the water line. Its western side is steep-to. The currents run with considerable velocity between Powerful and Admiral Islands.

Dampier's Monument, southward of Powerful Island, though small, is the most conspicuous island of the archipelago. It is conical, with a rounded summit, 283 feet high, on which is a solitary bush. A reef extends 500 yards from its eastern side, and there is a patch of $2\frac{3}{4}$ fathoms off its southwestern side; elsewhere it is steep-to.

5-32 Sir Frederick Island, 260 feet high, lies 1 mile westward of Dampier's Monument. It is 2 miles long, eastward and westward, and 1.5 miles wide. The bights in it are dry off to their entrance points.

Small islets, 45 and 55 feet high, lie close to its southeastern extremities on the same reef.

Reefs with rocks, 40 to 57 feet high, lie from 1,000 yards to 1 mile westward of Sir Frederick Island.

Lord Island and Byron Island, 216 and 285 feet high, respectively, are situated on the same reef southward of Dampier's Monument. The southern coast of Byron Island is steep-to, the western sides of both being cliffs fronted by coral reefs. This reef extends a distance of 1 mile northeastward of Lord Island, with rocks below mentioned.

5-33 Finch Islets ($16^{\circ}08' S.$, $123^{\circ}28' E.$) are a group of rocks, from 43 to 155 feet high, on the reef lying northeastward of the northern extremity of Lord Island.

Reefs which dry extend 1.3 miles northwestward of the western extremity of Byron Island; the outer dries 3 feet, the one between 22 feet, with a rock 6 feet high between it and the island.

Gagg Islets are a group of small islets and rocks, ranging from 70 to 169 feet high, mostly connected by reef, lying nearly parallel to the southern side of Byron Island, for 3.5 miles, rendering the channel between Byron and Hidden Islands dangerous.

5-34 Gibbings Island ($16^{\circ}09' S.$, $123^{\circ}31' E.$), circular in shape, with an extreme width of 1.3 miles, lies midway between Byron Island and Margaret Island. It is steep-to at its northern and southern extremities, but a coral reef extends 700 yards off its western side and 1,400 yards off its eastern side. Its summit, which is a bare rock, is 281 feet high.

A patch which dries 1 foot lies 1,000 yards southeastward of the southeastern extremity of Gibbings Island. Between the patch and

the eastern shore is a rock, 46 feet high, at 1,500 yards off the mainland, and with a patch of $1\frac{1}{2}$ feet at 300 yards from the mainland.

Dorothy Island, 144 feet high, is a narrow island eastward of Gibbings Island, and encircled by the same reef. It has a rocky islet, 104 feet high, close off its northwestern end.

5-35 Hidden Island (*H.O. Charts 3419, 3420*), the largest of the archipelago, appears as a portion of the mainland, but is separated by a narrow channel. It is of irregular shape, and about 5 miles long, northward and southward, with an extreme width of 3.3 miles. Its summit, near the southern end, is 442 feet high; on the northern part is a hill, 320 feet high. The island is covered with low scrub and stunted gum trees.

There is a large bay on the southeastern side of the island, with a mangrove swamp at its head, fronted by mud flats, which form the northern side of Whirlpool Pass.

5-36 Bayliss Islands, a narrow string of islands connected at low water, lie 900 yards off the northeastern part of Hidden Island; the northern and largest is 185 feet high. A series of detached reefs extend for a distance of 1.5 miles northwestward of the Bayliss Islands, on which are four rocks from 4 to 61 feet high. A reef, with depths of less than 3 fathoms, lies parallel to, and about one-fourth of a mile from, the eastern coast of the northern Bayliss Islands.

Between Bayliss Islands and the mainland are a number of islets and reefs, mostly on the eastern side of the northern approach to Whirlpool Pass; a reef which dries 3 feet lies in the fairway westward of them, about midway between the northern extremity of Bayliss Islands and the southeastern extremity of Gibbings Island; the chart affords a

better idea of them than any written description.

5-37 Whirlpool Pass (*H. O. Chart 3419*) is between Hidden Island, on the westward, and Chambers and Dunvert Islands, on the eastward. It is only 400 yards wide at its narrowest part, and the tidal currents run with great rapidity through it, forming whirlpools, and it should only be navigated at slack water by small craft with local knowledge.

5-38 Chambers Island ($16^{\circ}16' S.$, $123^{\circ}32' E.$), eastern side of Whirlpool Pass, practically connected with the mainland, is 2.5 miles long and 1,400 yards wide; its summit, 302 feet high, is at its eastern end.

Several islets from 120 to 180 feet high are situated northward and northeastward of the eastern end of the island, between it and the mainland, and forming the eastern point of the entrance to Whirlpool Pass from the northward.

Dunvert Island, 294 feet high, lies to the southward of Chambers Island, at right angles to it, being connected by a coral reef which dries at low water.

Steep Head, its southern extremity, is a cliffy point, 292 feet high, with a reef extending 500 yards in a southerly direction.

Two islets, 142 and 10 feet high, lie 600 yards and 1,200 yards from the eastern side of Dunvert Island, and between them and the mainland is a shoal with depths under 3 fathoms.

5-39 Shirley and Dorney Islands, nearly joined together, lie on a reef situated between 1.5 and 5.5 miles westward of the southern end of Hidden Island; the former is 236 feet and the latter 146 feet high. The northern and eastern extremities of Shirley Island are steep-to.

Tyrer Islets, 78 feet high, are a group of islets and rocks on the western end of the same reef, on which are Dorney and Shirley Islands. Foul ground extends 1,500 yards south-southeastward of Tyrer Islets. A

shoal patch, with a least depth of 4 fathoms, lies about $1\frac{1}{4}$ miles southward of the westernmost Tyrer Islet, and a $1\frac{3}{4}$ -fathom patch lies about one-half of a mile southward of the southern Tyrer Islet.

A $\frac{3}{4}$ -fathom patch, the position of which is approximate, lies about $1\frac{1}{4}$ miles west-southwestward of the light structure on the westernmost islet.

Three Islands, 147 to 230 feet high, which extend on a distance of 1.5 miles in an east and west direction lie 1.5 miles south of Dorney Island. A rock that uncovers 8 feet lies about one-half of a mile eastward of the 230-foot islet.

Packer Islets are a group of islets or rocks on detached coral reefs situated in the channel between Dorney and Shirley Islands on the westward and Hidden Island on the eastward; they are mostly steep-to.

5-40 Vickery Reef ($16^{\circ}19' S.$, $123^{\circ}30' E.$), dry from 3 to 10 feet at low-water springs, lies 1.4 miles southwestward of Steep Head in the fairway of vessels approaching Whirlpool Pass from the southward, and in the approach to Strickland Bay. Several shallow heads lie between Vickery Reef and Packer Islets.

A rock which dries 25 feet lies 1,500 yards southeastward of Vickery Reef, and with a patch which dries at 600 yards westward of it.

5-41 Bedford Islands (*H. O. Chart 3419*), with the smaller islets off it (southward of Caffarelli Island, the northwesternmost of the group), form the southwestern chain of islands of the Buccaneer Archipelago. It consists of two islands with a channel between which dries at low water, and through which the tidal currents run with considerable velocity. The islands together are 4.5 miles in length in a northwestward and opposite direction, with an extreme breadth of 1.3 miles. The northern island is 185

feet high and the southern 170 feet; both summits are bare, and the islands are covered with scrub. Both islands are much broken up, forming many bights, all of which dry at low water.

Godsmark Islet, 91 feet high, lies on the northern extremity of the reef which extends 600 yards off the northwestern point of North Bedford Island; it is steep to beyond the reef. The island is of a very rugged appearance and being composed of dark-colored rock is easily recognized.

Brown Reef ($16^{\circ}07' S.$, $123^{\circ}17' E.$) dries 1 foot at low water springs, and lies 1,600 yards 299° from Godsmark Islet.

5-42 Asshlyn Islets ($16^{\circ}08' S.$, $123^{\circ}17' E.$), the highest of which is 60 feet high, are four islets situated on the reef which extends about 1,000 yards southwestward from the western extremity of the northern Bedford Island.

Tucker Reef dries 2 feet, with deep water around it, and is situated 1.6 miles bearing 220° from the summit of the northern Bedford Island.

The southern coast of South Bedford Island is very foul, being fronted by reef with numerous islets and rocks.

5-43 Pope and Goat Islets lie off its southern and southwestern extremities, respectively, at distances of 1,000 yards each, and are the largest. Pope Islet is 98 feet high, bare, and its reef is nearly connected with the island reef. Goat Islet, 85 feet high, is on a detached reef, and is bare.

Bennet Reef dries 3 feet, is of small extent, and lies 244° 1.1 miles from Pope Islet; there is a small reef between.

Fleetwood Rock is an isolated pinnacle rock with a depth of 3 feet, bearing 166° 1.2 miles from Pope Islet.

Norris Reefs are a group of coral heads, nearly 2 miles in extent, in a northward and southward direction, drying from 1 to 26

feet at low water springs, lying between 1 and 1.8 miles eastward of the southern Bedford Island, between it and Byron Island. A rock, 4 feet high, is located about $1\frac{1}{4}$ miles northeastward of the southeastern extremity of the southeastern Bedford Island.

5-44 Dickenson Ridge (*H. O. Charts 3595, 3597*) is a narrow ridge lying between the Bedford Islands and Tyrer Islet, situated on the western end of the reef which extends westward of Dorney and Shirley Islands. It has depths varying from 3 feet to $5\frac{1}{2}$ fathoms, the shoalest water being near the northern end, at a distance of 1.8 miles from the southeastern point of Bedford Island. There are patches of 3 fathoms on the ridge at 3.1 and 3.8 miles southward of the shallow head. Between its southern extremity and Tyrer Islet reef the channel is 1,500 yards wide, and is deep.

Fairthlough Ridge is a similar ridge extending 4.5 miles northward from the western end of Tide Rip Islands, parallel to Dickenson Ridge and 5.5 miles to the westward of it. The least depth is 3 fathoms at the distance of 1.5 miles, and $4\frac{1}{2}$ fathoms at 2.8 miles northward of the western end of Tide Rip Islands.

Tide rips.—There are heavy tide rips over Dickenson and Fairthlough Ridges at springs which should be avoided by small craft.

Witcomb Reefs are 2 miles in extent in an easterly and westerly direction; the western reef, which dries 3 feet at low-water springs, lies 1.2 miles 002° from the northeast extremity of Tide Rip Islands. The northernmost of these reefs dries 18 feet, and lies 1.4 miles from the western reef; the southern head dries 10 feet. Patches, with depths of $4\frac{1}{4}$ and $4\frac{3}{4}$ fathoms, lie about $\frac{3}{4}$ and $1\frac{1}{2}$ miles eastward, respectively of the southern reef.

5-45 Dangers—Northern approach to King Sound (*H. O. Chart 3595*).—The following reefs lie in the northern approach to King Sound, westward of the Buccaneer Archipelago.

Frost Shoal ($15^{\circ}47' S.$, $123^{\circ}21' E.$), the most important danger in the channel between Adele Island and Caffarelli Island, has a least depth of 3 fathoms and is situated on the eastern end of a bank 1.5 miles long in an eastward and westward direction within a depth of 10 fathoms lying 017° , 16 miles from the summit of Caffarelli Island. Depths under 20 fathoms extend 2.8 miles eastward of the shoal and 4 miles westward.

Tasmanian Bank, 1.8 miles in length, within the 20-fathom curve, has a least depth of 9 fathoms near its center, which lies 026° , 10.5 miles from the summit of Caffarelli Island.

Brué Reef, the highest part of which dries 22 feet at low water springs, is a triangular-shaped coral reef 2.4 miles in length in a northwestward and southeastward direction, with numerous boulders on it, chiefly at its northern end. The reef is steep to all round, excepting the $2\frac{3}{4}$ -fathom patch near its southwestern extremity.

Its center is situated in $15^{\circ}56' S.$, $123^{\circ}02' E.$, bearing 295° , 15.5 miles from the summit of Caffarelli Island.

5-46 Anchorage.—There is temporary anchorage at about 1 mile eastward of Brué Reef on the bank 1.7 miles in extent, within a depth of 20 fathoms, sand and coral. The least depth on it is 10 fathoms. It should be used only in settled weather, as a heavy swell quickly rises in this vicinity.

Shepherds Patch, with a least depth of 9 fathoms, is situated on a bank with depths under 20 fathoms, at the northwestern extremity of some ridges extending from near the Twin Islets.

This patch bears 242° , 8 miles from the center of Brué Reef.

Etheridge Patch, with a least depth of 10 fathoms, is situated on one of these banks, 5 miles in length, with depths under 20 fathoms; the patch bears 202° , 11 miles from the center of Brué Reef.

Breeding Patch, with a least depth of 8 fathoms, is situated on a bank 3 miles in length within a depth of 20 fathoms. This patch lies 312° 3 miles from Fraser Rock.

Fraser Rock, with a least depth of $11\frac{1}{2}$ fathoms, is a dangerous rocky pinnacle, which lies in the track of steamers approaching King Sound from the northwest. It lies 249° 13.5 miles from the summit of Caffarelli Island; it should be given a wide berth.

Fitzgerald Patch, with a least depth of 7 fathoms, lies 141° 4 miles from Fraser Rock. The bottom between Breeding and Fitzgerald Patches is very uneven, and long lines of tide rips are observable at near spring tides.

5-47 Pincombe Reef ($16^{\circ}05' S.$, $123^{\circ}10' E.$, *H. O. Chart 3495*) is a pinnacle rock which dries 6 feet at low water springs, lies 248° 6.5 miles from the summit of Caffarelli Island. The tidal swirls around it extend at least 1,000 yards during the strength of the current.

Thornbury Reef, about 1.5 miles westward of Caffarelli Group, has been described with those islands.

5-48 Tides and tidal currents.—It is high water, full and change, at Cockatoo Island in the Buccaneer Archipelago at 0h. 15m.; springs rise 27 feet, neaps 17 feet, neaps range from 3 to 11 feet; and at Bedford Island at 0h. 25m.; springs rise 25 feet, neaps 16 feet (June to October).

At the equinoxes the spring rise is $5\frac{1}{2}$ feet greater, the neap range being then from $1\frac{1}{2}$ to 3 feet only. The greatest range of

the tide takes place at from $2\frac{1}{2}$ to 3 days after full or new moon.

Throughout the period of observation the tides were tolerably regular, the flood and ebb running about 6 hours each, the period of slack water being short, the change taking place at high and low water by the shore.

The general direction of the flood was toward King Sound.

Westward of Bedford Island, in the vicinity of Pincombe Reef, the currents turn from 1 to 2 hours after high and low water at that island. Here the currents attain a velocity of 3 knots at springs, increasing in strength when passing over the shoaler patches and forming heavy tide rips and swirls.

5-49 KING SOUND (*H. O. Charts 3597 and 3420*) is a spacious arm of the sea extending about 65 miles southward from Sunday Strait to Derby at the entrance of Fitz Roy River; it is 30 miles wide at about halfway up the sound, has depths in its central portion of 15 to 25 fathoms, shoaling gradually toward the shore in most places and affording anchorage nearly all over it. Its entrances are deep, but the tidal currents run with considerable strength in most of them.

5-50 Sunday Strait, the main entrance to King Sound, is situated between Salier Islands, west of Tide Rip Islands, High Island, Tree Island, and Mermaid Islands on the eastward, and Pincombe Shoal, the Roe Islands, and Sunday Islands on the westward. It is about 11 miles in length north and south by about 4 miles least breadth between the East Rose Island and Hancock Reef, which extends westward of Tree Island. The tidal currents run with considerable velocity from 4 to 8 knots, and must be guarded against in vessels of low power. The fairway dangers are Menmuir

Rock, with dangerous overfalls during the strength of the currents, and Amur Reef and Alert Rock, 6 and 7 miles within it.

5-51 Sunday Strait, northern approach—Eastern side.—The following islands and dangers lie on the eastern side of Sunday Strait, approaching from the northward.

5-52 Tide Rip (Kurui) Islands.—This group of rocky islands occupies a space 2 miles long in an easterly and westerly direction, and 1.5 miles wide. Gibson Island, 108 feet high, and Gregory Island, 133 feet high, are the largest of the group, and are both of irregular form, standing on the same reef and nearly connected at their northern extremities.

A coral patch, drying 2 feet, is situated 500 yards southward of Gibson Island.

Fresh water can be obtained from a well on the northwestern side of Gibson Island.

Doris Island, 127 feet high, is the northwestern of the Tide Rip Islands, and is nearly 1,000 yards long by 500 yards broad; it is separated from Gibson Island by a narrow channel.

Salier Islands.—These bare, rocky, small islands form a closely connected chain, steep-to, 2 miles long in a northwestward and southeastward direction, from 61 to 97 feet high, and about 100 yards wide; they are separated from Tide Rip Islands by a channel about a mile in breadth, which has not been sounded closely.

5-53 High (Urtala) Island ($16^{\circ}21' S.$, $123^{\circ}21' E.$), 292 feet high and 2.3 miles in length by 1 mile in breadth, is situated about 1 mile southeastward of Gregory Island; the western side is steep-to, high, and cliffy; the southern coast is much indented and has a fringing reef.

A narrow reef extends about three-fourths of a mile northward from its northeastern coast, and a small detached reef, which dries 18 feet, lies close off the northern extremity

of the island. A reef, with a rock on it 42 feet high, extends about 500 yards south-eastward from the southeastern extremity of the island.

Fresh water can be obtained on the southern side of the island.

The ebb current sets strongly, 4 to 8 knots, toward the southern coast of High Island.

5-54 Tree Island ($16^{\circ}23' S.$, $123^{\circ}18' E.$, *H. O. Chart 3597*), 85 feet high, 600 yards long, and about 250 yards broad, lies 2 miles southwestward of High Island, and forms the eastern side of the entrance to Sunday Strait. A conspicuous bush is situated on the eastern hill of Tree Island.

Reefs surround Tree Island, extending 800 yards westward into the strait, with rocks on it, the western one of which is 20 feet high.

Hancock Reef dries 16 feet, and is situated 600 yards southwestward of the rocks mentioned, to which it is connected by a shallow rocky ledge; its western edge lies 265° , 1,500 yards from Tree Island summit.

5-55 Clarke and Wood Islets.—Reefs extend 1.6 miles southeastward from Tree Island, having upon them several islets and rocks, of which Clarke Islets, a group of three, 18 feet high, are situated on the southwestern edge; Wood Islets, from 3 to 16 feet high, form a chain near the northeastern edge.

Pillar Rock, 18 feet high and conspicuous, is situated 200 yards within the southern edge of these reefs, and a rock which dries 10 feet lies on the extreme edge, forming the western side of Mermaid Passage.

Mermaid Passage, about 1 mile broad, separates Wood Islets Reef, on which is Pillar Rock, from Mermaid Island.

A bank, with a depth of $6\frac{1}{2}$ fathoms, and possibly less, marked by strong tide rips, is situated in the center of Mermaid Passage.

Mermaid Island, 218 feet high, 2 miles long in a northward and southward direction, and 1 mile broad, is a rugged island, situated 2.5 miles southeastward of Tree Island; reefs, with rocks above water, extend from the northern and southern extremities, but the eastern and western sides are fairly steep-to. A reef, with three islets and some rocks on it, extends as far as one-half of a mile from its southeastern side.

A detached reef, drying 5 feet, is situated 800 yards, 013° , from the islet 57 feet high off the northern extremity of Mermaid Island.

5-56 Wybron Islets, a group of four rocky islets standing on the same reef, of which the highest is 48 feet high, are situated 1,500 yards southward of Mermaid Island; the channel between the reefs on either side, 600 yards wide, is free from dangers, but the tidal currents are varying in direction.

Channel Rock ($16^{\circ}26' S.$, $123^{\circ}23' E.$), 6 feet high, is a small reef steep-to in the northern entrance to Fantome Passage, and situated 090° , 1.2 miles from the southeastern extremity of Mermaid Island, the channel between being deep and free from dangers.

Fantome Passage, about 1 mile broad, and free from dangers, separates Wybron Islands from Vickery Island, and affords the best passage for vessels proceeding from King Sound to Yampi Sound.

Vickery Island, 15 feet high, is a small bare islet surrounded by a reef, and is the northwestern of two parallel chains of small rocky islands, covered with scrub and long grass, about 300 yards apart, extending to Faint Point, the southwestern entrance point of Crawford Bay.

5-57 Directions—King Sound from the northeastward (*H. O. Chart 3595*).—In the approach from the northeastward or northward pass to the northward of the Macleay

Islands and after clearing Frost Shoal in the channel to the south of Adele Island, pass between the western island of the Caffarelli group and Thornbury Reef, 1.3 miles westward of that island; or, if advisable, westward of Thornbury Reef. From thence make good a course to pass from 2 to 3 miles to the westward of the Bedford Islands and of the Tide Rip Islands for Sunday Strait, eastward or westward of Menmuir Rock, which lies in the fairway, directions for which are given with the western approaches from off Cape Leveque, (sec. 5-110).

Small craft with thorough local knowledge proceed southward from Yampi Sound, westward of Margaret Island (east), and between the islands and dangers southward of it, and through Whirlpool Pass, near the eastern shore, into King Sound. The pass is only navigable at slack water.

At 14 miles farther southward is a similar passage, known as Hell Gates, whence King Sound is entered; the same remarks as for Whirlpool Pass apply to it.

5-58 ISLANDS (H.O. Chart 3420).—Between High Island and the northern entrance point of Cone Bay, on the mainland, a chain of islands and rocks extend, of which the following are the principal: Wall, Margaret, Folly, Muddle, and Cussen Islands, with Cone Rock off Sir Richard Island, the northern extremity of the bay.

The tidal currents run strongly through the passages between these islands.

5-59 WALL ISLAND (16°22'S., 123°22'E.), the westernmost of this chain, is 139 feet high, 700 yards long, and 400 yards broad; it is cliffy on all sides except the western, where there is a small bay fronted by reef.

A pillar rock is situated close to the eastern extremity, and from the western point a reef, with a rock upon it, extends 300 yards to the westward.

5-60 MARGARET ISLAND (H.O. Chart 3419), eastward of Wall Island, of irregular shape, is 1.1 miles long in an east-southeastward and opposite direction; with two hills, the eastern 131 feet high, and the western 126 feet high; on the southern side is situated a bay in which are two small islets.

To the southward of Margaret Island a vessel may anchor out of the strength of the tide.

This island is separated from Wall Island by a channel 500 yards wide.

An island 1,000 yards long and 400 yards broad, lies close northward of Margaret Island, and is connected at low water with the eastern side of that island.

A reef extends 300 yards off the northeastern point of this island and continues to 400 yards off the southeastern point of Margaret Island.

WAY ROCK (16°24'S., 123°24'E., H.O. Chart 3420), with a depth of 3 feet of water on it, and depths of 4 to 5 fathoms close around, lies 173°, 1.5 miles from the southern point of Margaret Island.

5-61 DIRECTIONS FOR CLEARING.—The square-topped hill, 614 feet high, at the head of Cone Bay in line with the summit of Razor Island bearing 111° leads 1,350 yards to the north-northeastward of Way Rock, and 700 yards to the south-southwestward of the foul ground off Folly Island.

5-62 FOLLY ISLAND, 206 feet high, is 1,200 yards long in an eastward and westward direction, and 1,000 yards broad; from the western extremity a reef extends 300 yards.

A coral patch 200 yards in diameter with a rock 1 foot high on it, is situated 850 yards, 145° from the western extremity of Folly Island.

A shoal of 3 1/2 fathoms is situated about 1 mile south-southeastward from the western extremity of Folly Island.

The MUDDLE ISLANDS, a group of four small islands, of which the southeastern is 97 feet high, are connected with the eastern side of Folly Island by a reef which dries.

A REEF, about 1,000 yards in extent, with two islets, 70 and 108 feet high, and steep-to on the southern side, lies in midchannel between Margaret and Folly Islands.

5-63 ISLANDS AND DANGERS NORTHWARD OF FOLLY ISLAND.—A chain of islands, the highest of which is 165 feet high and sunken rocks, extend about 3 miles northward from Folly Island, of which the chart affords the best information.

SPLIT ROCK, eastward of the chain, has a depth of 4 feet, and is situated in the center of the channel leading to Yampi Sound, at 1.3 miles 358° of the northwestern extremity of Cussen Island.

The channels on both sides of Split Rock are deep; that to the eastward is 800 yards broad and that to the westward 1,200 yards, with depths of from 13 to 23 fathoms; this latter is by far the better of the two.

CUSSEN ISLAND (16°23'S., 123°28'E., H.O. Chart 3420), 95 feet high, 600 yards long, and 250 yards broad, is separated from the Folly Island group by a channel 1,800 yards wide, which is available for vessels proceeding to Yampi Sound by those acquainted with the navigation of these parts.

A reef fringes the northern and eastern sides of Cussen Island, marked on the northern edge by a small rock above water, and extending 500 yards from the eastern side of the island.

ROCKS.—A rock, which dries 18 feet, and a small coral reef, are situated 800 yards 114° from Cussen Island in the center of the channel between it and an island 58 feet high.

A rock, awash at low water, is situated 1,100 yards 198° from the northwestern extremity of Cussen Island.

At about 2 miles southeastward of Cussen Island is the extremity of the peninsula form-

ing the northern side of Cone Bay, and separating it from Strickland Bay.

5-64 ISLANDS AND ROCKS EASTWARD OF MERMAID ISLAND.—A chain of islands and rocks extend between Mermaid Island and the southern entrance point of Cone Bay; the principal of these are: Channel Rock (before mentioned), Farr, Herbert, Barnicoat, and Greenhalgh Islands.

TIFFY REEF (16°25'S., 123°25'E.), which dries 8 feet is a sandbank 1,200 yards long in a northward and southward direction, and 600 yards broad, situated 2.3 miles, about 069° from Channel Rock.

Three patches of boulders on this bank uncover, and shoal water extends 300 yards to the northward, 1,000 yards to the southward and 200 yards eastward and westward of it.

WAY ROCK, situated 1.5 miles northwestward of Tiffy Reef, was previously described with Margaret Island.

HERALD ROCK, situated on a small reef at 1.3 miles eastward of Tiffy Reef, and 1.8 miles 033° from the eastern extremity of Herbert Islands, dries 21 feet; there are depths of 11 to 16 fathoms near the reef.

FARR ISLANDS, a group of five small islands and rocks, stand on a circular reef, which dries at low water, steep-to on the western side, and situated 1.2 miles southeastward of Channel Rock, the passage between being deep and free from dangers. The western and largest island is 29 feet high.

A small islet, 6 feet high, and a rock which dries 18 feet, are situated about 200 yards southward of this group.

5-65 HERBERT ISLANDS are two small narrow islands, 300 yards and 800 yards long and 21 and 55 feet high, respectively, standing on the same reef, which extends 300 yards westward of the smaller, with a (continued on page 187)

sunken rock 250 yards westward of it, and 600 yards northward of the larger island.

Herbert Islands are separated from Farr Islands by a channel 1,200 yards wide and from 12 to 30 fathoms deep.

Barnicoat Island, of irregular shape, is 71 feet high, 1,400 yards long and 800 yards broad; it is separated from Herbert Islands by a channel 600 yards wide.

5-66 Greenhalgh Islands ($16^{\circ}28' S.$, $123^{\circ}26' E.$, *H. O. Chart 3420*) comprise one large island, 84 feet high, 800 yards long, and 300 yards broad, and a small sharp-ridged islet close southward of it, and connected by a reef which extends from the northwestern point of Greenhalgh Island for 1,200 yards in an easterly direction, forming a narrow spit, which dries and recurves to the southward to rejoin the small islet.

A small rocky islet, 7 feet high, stands on this reef.

The channel between Greenhalgh Islands and the southern entrance point of Cone Bay is 1,200 yards broad, but the space between the island and Heney Island to the southward is encumbered with shoals.

5-67 Islands south-southeastward of Mermaid Island (*H. O. Chart 3420*).—Vickery Island, described in section 5-56, is the northwestern of two parallel chains of islands, small, rocky, and covered with scrub and long grass, about 300 yards apart, extending from Fantome Passage to Faint Point, the southwestern entrance point of Crawford Bay.

The northern chain is formed by Scott Island, 75 feet high, and Kessel, Pope, Whipp, Dove, Heney, Cheriton, and Dempsey Islands; the southern chain is formed by Vickery, MacMahon, 119 feet; Hazel, 165 feet; Leila, 21 feet; and Pasco Islands.

Anchorage.—Good anchorage, out of the strength of the tidal currents, can be obtained in a depth of 14 fathoms, sand and

coral bottom, at about 1,000 yards from the shore, northeastward of Scott and Kessel Islands.

5-68 Pasco Island, about 140 feet high, 1.3 miles long and 1 mile broad, is situated about 2.5 miles southeastward of Vickery Island.

A broad coral reef fringes Pasco Island, on the northwestern edge of which are situated Hazel Island, 165 feet high, and Leila Island.

Two islets, 20 and 18 feet high, are situated 100 and 600 yards, respectively, southwestward of Pasco Island; a small reef, which dries, lies 600 yards westward of the outer of these islets.

5-69 Heney Island ($16^{\circ}30' S.$, $123^{\circ}23' E.$), 160 feet high, is situated 500 yards northward of Pasco Island; a broad coral reef extends 1,500 yards northward from the northern side of this island; shoal water extends 1,000 yards northward of this reef.

A rocky islet, 25 feet high, is situated on the southern edge of a reef at 1,200 yards northeastward of the eastern extremity of Heney Island. Rocks abound in this vicinity, as charted.

Pecked Island, 280 feet high, 1.5 miles long, and nearly 1,000 yards broad, is situated east-southeastward of Heney Island and southward of Faint Point of Crawford Bay on the eastern shore; the southern coast is cliffy, high, and steep-to.

A small island, 69 feet high, is situated on the coral reef which extends 1,000 yards westward of Pecked Island.

A small group of islets, situated close northward of Pecked Island is separated from it by a channel having a depth of from 9 to 16 fathoms, in the western approach to which are three reefs which dry from 5 to 6 feet. The rocks are too numerous to afford a lengthy description.

5-70 Hell Gates (*H. O. Chart 3420*) is the name given to the locality included between Heney Island, Faint Point, Pasco Island, and Pecked Island on account of the strong tidal races experienced in the deep channels among them; this locality should be avoided.

Tidal currents.—The flood current sets southward through Hell Gates, and the ebb current to the northward, attaining velocities of from 5 to 10 knots.

5-71 Morrisey Island, 109 feet high, 400 yards long, and 200 yards broad, is situated 1,200 yards eastward of the southern extremity of Pasco Island, and on the Western side of Hell Gates.

Three rocks the northern of which uncovers 17 feet, are situated close to the western side of Morrisey Island, and a rocky ledge, with outlying patch, extends 700 yards eastward from the southeastern extremity.

Pack Island, a narrow island, 400 yards long, 75 feet high, and surrounded by a coral reef, is situated 1 mile northward of Morrisey Island.

A detached rock, with less than 6 feet, lies 400 yards southeastward of Pack Island, and a pinnacle rock, 3 feet high, standing on a narrow reef, is situated 1,000 yards westward of the island.

5-72 Long Island (*northern extremity 16°32' S., 123°21' E., H. O. Chart 3420*) is a rugged island 5 miles long in a north-northwest and south-southeast direction, and from 1,000 yards to 1.3 miles broad. It lies across the entrance of Cascade Bay, and forms part of the eastern side of the fairway of King Sound, southward of Alert Rock. The northern extremity is situated 1.5 miles westward of Pasco Island. Apparently it has not yet been surveyed along its southern and southeastern extremities.

5-73 Western approach (*H. O. Chart 3419*)—**General remarks.**—Cape Leveque and Swan Point, about 6 miles eastward of it, are the northern extremities of a peninsula some 40 miles in length, within which is the western shore of King Sound. Shoals extend about 7 miles northward of the cape, and islets and shoals extend some 12 miles eastward of Swan Point, terminating in Sunday Islands. Between these are the surveyed channels leading to Sunday Strait, southward of Pitt Shoal and the Twin Islets and into King Sound. Meda Pass, between the Roe and Sunday Islands, is the recommended route. Escape Pass, 2.5 miles eastward of Swan Point, leads directly into King Sound, but on account of the strong tidal currents local knowledge is considered necessary for its safe navigation.

5-74 Cape Leveque, the northwestern extremity of the peninsula, is a red cliffy point about 120 feet high. Reefs, on which is Leveque Island, extend 1 mile northward and 1,200 yards westward of the cape.

Aspect.—A group of red sand hills is situated 2 miles eastward of Cape Leveque, inland of which Boolgin Station is established, where good fresh water can be obtained from a well.

White sand hills rise over the coast between the red sand hills and Cape Leveque.

Light (*16°23' S., 122°55' E.*).—A light, 142 feet above high water, is exhibited from a white iron tower on the summit of Cape Leveque.

Vessels can communicate with the lighthouse by the International Code or by radio-telephone.

5-75 Leveque Island, 55 feet high, and flat-topped, formed of red sandstone faced on all sides by cliffs, is 500 yards long and

(7209) **AUSTRALIA—Northwest coast—Pitt Shoal—Depths.**—Depths have been reported (1966) as indicated; distances and bearings from Cape Leveque Light ($16^{\circ}24.5'$ S., $122^{\circ}54.6'$ E. approx.) :

(a) 2 fathoms about 9.3 miles $333^{\circ}45'$.

(b) $2\frac{1}{2}$ fathoms about 7.7 miles 339° .

(c) $5\frac{3}{4}$ fathoms about 11.2 miles 316° .

(N.M. 46/66.)

(N.M. 40(388), Sydney, 1966.)

H.O. Charts **3420, 3419, 3416.**

H.O. Pub. 74, 1952, page **189.**

(7760) AUSTRALIA—Northwest coast—Pitt Shoal—Depths.—1. The 2-fathom depth about 9.3 miles $333^{\circ}45'$ from Cape Leveque Light ($16^{\circ}24.5'$ S., $122^{\circ}54.6'$ E. approx.) will be expunged.

(See N.M. 46 (7209) 1966.)

2. A depth of 2 fathoms will be substituted for the 3-fathom depth about 9.3 miles $343^{\circ}45'$ from the light in (1).

(N.M. 50/66.)

(N.M. 43 (420), Sydney, 1966.)

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200 yards broad; it is surrounded by reefs which connect it with Cape Leveque and extend 700 yards west-southwestward from it.

Ball Rock, with a depth of $1\frac{3}{4}$ fathoms, is situated at 1,000 yards 003° from Leveque Island.

Jonas Shoal.—Between Cape Leveque and Hunter Creek, 3.5 miles apart, the coast forms a bay, completely obstructed by reefs, known as Jonas Shoal, the most northern dangers on which are patches of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms, situated about 058° from Leveque Island, 2.1 miles and 2.3 miles respectively.

5-76 Coast.—Hunter Creek is about 3 miles long in a southwesterly direction; it dries at low water, but can be entered by small craft at high water when there is a depth of from 14 to 18 feet on the bar. The position of the entrance channel is liable to change.

From Hunter Creek the coast is backed by low sand hills to Swan Point, 3 miles eastward, fronted by foul ground to the distance of about 600 yards.

A patch of 2 fathoms lies 800 yards off-shore, being 282° 1,500 yards from Swan Point.

Swan Point ($16^\circ 21' S.$, $123^\circ 02' E.$), the northwestern extremity of King Sound, is low and cliffy.

5-77 Swan Island, 50 feet high, 1,000 yards long, is situated 500 yards north-northeastward of Swan Point, with which it is connected by a ridge of rocks which dries 12 feet.

Karrakatta Rock, with a depth of 2 fathoms, is situated on the northwestern edge of a rocky ledge extending 1,000 yards 293° from the northern extremity of Swan Island.

Channel.—Between Karrakatta Rock and the eastern extremity of Alarm Shoal is a deep channel 1,000 yards wide leading from

seaward to King Sound, by Meda Pass or by Escape Pass. The tidal currents rush around Swan Island with considerable violence, rendering the passage hazardous for sailing craft.

5-78 Dangers outlying Cape Leveque.—**Pitt Shoals** ($16^\circ 15' S.$, $122^\circ 53' E.$, *H. O. Chart 3597*) are the outer and westernmost dangers in the western approach to Sunday Strait. The main ridge within the 10-fathom curve is about 4.5 miles in length eastward and westward, and from 400 to 1,000 yards in breadth, including detached patches. The least depth on this ridge is 4 fathoms, bearing 338° about 8 miles from Cape Leveque Lighthouse.

At the distance of 1.5 miles 018° from the 4-fathom head is a shoal about 400 yards in extent, with a least depth of 3 fathoms, in $16^\circ 15' S.$, $122^\circ 53' E.$ At 500 yards northward of this shoal is the edge of the 20-fathom curve, within which line the bottom all over the Pitt Shoals is very irregular.

Tidal current.—Over the Pitt Shoals the flood sets eastward and the ebb westward at the rate of 1 to $3\frac{1}{2}$ knots, and also in the fairway between them and Alarm Shoal.

5-79 Alarm Shoal, between Pitt Shoals and Cape Leveque is, within the 10-fathom curve, about 8.5 miles in length in an easterly and westerly direction, nearly parallel to the fairway, and with its eastern extremity converging on Swan Point, 6.8 miles, eastward of Cape Leveque. It is from 1,000 yards to 1 mile in breadth, with depths varying from 2 to 5 fathoms.

At the distance of about 1.5 miles within its eastern end is a bank about 500 yards in length, which dries 2 feet at low water, with the northern end of Swan Island bearing 117° 2.3 miles. The shoal is steep-to on all sides outside the 10-fathom curve.

The eastern edge of the shoal is separated from Karrakatta Rock by a navigable chan-

nel about 1,000 yards wide, with depths of 7 to 11 fathoms, described with the coast and the inshore channel. Eastward of these dangers is a continuous line of islets and reefs extending to the eastern extremity of the Roe Islets, western side of Sunday Strait, below described.

5-80 Northwest Twin Islet, 30 feet high, and located $4\frac{1}{4}$ miles northwestward of Swan Island, is the northwesternmost of the group. It is a rocky islet, 300 yards in extent, surrounded by a coral reef extending from 200 to 500 yards from it.

A sunken, rocky flat, with depths under 2 fathoms, extends 1,200 yards northeastward from the islet.

Eastward of this flat is a shoal 1,000 yards in extent, with a least depth of $4\frac{1}{4}$ fathoms, steep-to. These flats are marked by strong tide rips.

Ferret Reef, 1,000 yards in extent, and steep-to, is nearly awash at low water. Its northwestern extremity is situated 304° 1.5 miles from Northwest Twin.

5-81 Southeast Twin Island, rocky, and 45 feet high, is 500 yards long and 300 yards broad; it is situated 2 miles southeastward of Northwest Twin Island, and is surrounded by a fringing reef extending from 200 to 400 yards from the coast, and steep-to on the western side.

Shoal water extends 1,000 yards northeastward from the island 500 yards southward and southwestward, and 200 yards to the southeastward.

A bank, with depths of from 7 to 9 fathoms is situated 1.5 miles southeastward of the Southeast Twin Island, with other patches of 9 fathoms in the same direction.

Channel.—There is a channel nearly 2 miles wide between the 5-fathom line eastward of Southeast Twin Island and the northwestern 5-fathom head of Anchor Shoal.

5-82 Anchor Shoal, with general depths of from $1\frac{1}{2}$ to 3 fathoms, is a sandy shoal extending, within the 5-fathom curve, for a length of 2.8 miles in a northwesterly and southeasterly direction, and having a breadth of about 700 yards.

The shoalest part is a small patch about 400 yards long, with a depth of 2 feet, situated nearly in the center, at 4 miles, 131° from Southeast Twin Island.

A detached shoal of 4 fathoms is situated 1,500 yards eastward of this shoal head.

Anchorage.—Vessels working into King Sound against the north-going current may find it convenient to anchor on the bank northward or eastward of Anchor Shoal.

5-83 Roe Islands (Thurlan) are two narrow islands extending 3.5 miles in an eastward and westward direction, and separated from Anchor Shoal by a channel 600 yards broad.

West Roe Island is rugged and bare, 108 feet high, 1.5 miles long, and about 500 yards broad; the southern side is steep-to, but a fringing reef extends from 200 to 600 yards from the northern coast. The reef that extends westward about one-half of a mile from the western side of the island appears to form part of the island. A rock, with a depth of less than 6 feet, lies about 1 mile north-northwestward of the western extremity of West Roe Island.

Several rocks, from 17 to 40 feet high, are situated close to the western end of the island.

East Roe Island, 1,800 yards eastward of West Roe Island, is 75 feet high at the eastern end and covered with coarse grass; the western end forms a knob 48 feet high.

The northern and eastern sides have narrow fringing reefs.

5-84 Mid Rock ($16^{\circ}22'$ S., $123^{\circ}12'$ E.), 12 feet high, is situated midway between

East and West Roe Islands; it stands on a reef nearly connected with East Roe Island.

Mid Rock is separated from West Roe Island by a deep channel 500 yards wide; the tidal currents in this channel set in varying directions.

Pincombe Shoal, of sand, gravel, and coral, with a depth of 5 feet near the center, is 2.3 miles long within the 5-fathom curve, and 500 yards broad; it is situated northward of the Roe Islands, from which it is separated by a channel 1,000 yards broad, with depths of from 13 to 20 fathoms. Its northern extremity, $4\frac{1}{4}$ fathoms, lies 333° , 2.3 miles from Mid Rock.

5-85 Sunday Islands (Yu Won) (*H. O. Chart 3597*) are two rugged islands, sparsely covered with scrub, of irregular form, and situated on the same reef, eastward of Poolngin Island. The eastern and smaller island is separated by a narrow passage which dries at low water, and extends in a north-northeastern and south-southwestern direction.

The northern coasts of both islands, which are separated from Roe Islands by Meda Pass, a channel about $1\frac{1}{4}$ miles wide, and are fringed by narrow coral reefs, which are wider on the eastern and southern sides and block the entrances to numerous mangrove-fronted indentations.

The western Sunday Island is 184 feet high, 3.3 miles long, and 1.5 miles broad; the eastern island is 160 feet high, 2.5 miles long, and 1,500 yards broad. The western side of the western Sunday Island is fronted by an extensive flat, on the edge of which are Allora and other Islands, mentioned with Hadley and Escape passes.

Mission.—A Protestant Mission Station is established in the bay on the western side of the western Sunday Island.

Landmarks.—A conspicuous boulder is situated westward of Waterlily Creek,

southern side of the western island, and a similar boulder near the summit of the eastern island.

5-86 Tides.—It is high water, full and change, at Sunday Islands, at 0h. 26m.; the mean spring rise is 21 feet 9 inches, mean neap rise 16 feet 3 inches, and mean neap range 10 feet.

5-87 Dangers.—The following islets and dangers front the northern, eastern, and southern sides of the Sunday Islands:

Dean Islet, an islet 35 feet high, steep-to on the northern side, is nearly joined to the northern side of the western Sunday Island.

Hunt Islet, 16 feet high, with a fringing reef surrounding it, is situated close to the northeastern point of the eastern Sunday Island.

Rip Rock, above water, with a rock having less than 6 feet close eastward of it, and foul ground, marked by strong overfalls, extending 400 yards southeastward of it, is situated 300 yards southeastward of Hunt Islet.

Pelican Rock, 10 feet high, a small rock surrounded by reefs, is separated from the southern coast of East Sunday Island by a narrow boat channel.

A reef, upon which are two rocks which uncover 20 and 16 feet, respectively, extends 800 yards southeastward from Pelican Rock.

Lone Reef, southwestward of Waterlily Creek, is described with Escape Pass.

Creeks.—Waterlily Creek, an islet on the southern side of West Sunday Island, is accessible to boats at high water, and Leering Bay is a narrow inlet on the northwestern coast.

5-88 Fairway shoals.—**Menmuir Rock** ($16^\circ 22' S.$, $123^\circ 15' E.$), with a depth of 2 fathoms, lies near the western end of a narrow ridge of rocky ground, having depths of 6 to 8 fathoms, marked by dangerous

overfalls, and situated in the fairway of Sunday Strait, about midway between East Roe Island and Hancock Reef.

The 2 fathom rock bears 099° distant 1.3 miles from the eastern extremity of East Roe Island.

Amur Reef, of coral, steep-to, and drying 4 feet, is 300 yards long in a northward and southward direction and 150 yards broad, situated in midchannel, about 6 miles southward of Menmuir Rock, and bearing 252° distant 4.5 miles from the southern extremity of Mermaid Island.

A narrow bank, with depths of from 5½ to 8 fathoms, and 500 yards long, it situated 700 yards eastward of Amur Reef.

Alert Rock, with a depth of 1½ fathoms, is situated 1 mile 162° from Amur Reef.

5-89 Fairway Islands (16°35' S., 123°19' E., *H. O. Chart 3597*), a rocky group about 1 mile in extent northward and southward, and 30 feet high, lie about 7 miles southward of Amur Reef and 2 miles westward of Long Island.

A coral reef, that uncovers 3 feet, is situated about 1¼ miles northward of Fairway Islands.

5-90 Coast.—From Swan Point (*H. O. Chart 3597*) the coast turns sharply to the southward for a distance of about 5 miles to One Arm Point, with several bays between, all of which are dry at low water and described below.

Nellie Point.—From Swan Point a cliffy coast trends southward for 1,000 yards to Nellie Point, from which a ridge of rocks extends southward for 150 yards, forming on the western side a good boat harbor, except near low-water springs when it dries.

Good fresh water may be obtained by digging above the high-water line in this vicinity.

5-91 Coast.—From Nellie Point a sandy coast recedes 1,500 yards and forms a bight

entirely filled by a reef on which are numerous rocks, which uncover from 1 to 4 feet.

Talboys Point, a cliffy point, 65 feet high, is situated 1 mile southward of Nellie Point, and forms the southern point of this bight.

Storry Hill, 120 feet high, and covered with scrub, rises at about 1,000 yards westward of Talboys Point and is the highest hill in this vicinity.

Easton Point (16°24' S., 123°02' E.).—From Talboys Point the coast, formed mostly by cliffs, with a narrow fringing reef, extends southward for nearly 1 mile to Easton Point, which is low and covered with boulders.

5-92 Anchorage.—**Karrakatta Bay**, between Swan Point and the reefs extending between Easton Point and Dickie Rock, affords convenient anchorage in a depth of from 11 to 12 fathoms, sand bottom, with the Northwest Twin Island in line with the eastern extreme of Swan Island bearing about 011° and with Nellie Point bearing 262° distant 1,000 yards.

5-93 Curlew Bay.—**Whimbrel Point**, low and stony, situated 1.3 miles southward of Easton Point, is the southern point of Curlew Bay, which recedes 1 mile and is encumbered with reefs, drying in patches, and which continue northward for 1.5 miles to abreast Talboys Point, with a narrow arm between the western edge of these reefs and the mainland, and a channel between their eastern edge and the reef on which Apex Island stands.

Home Patch, which uncovers 1 foot, and lies about 1,500 yards southeastward of Nellie Point is the northern extremity of the above reef, and the most outlying danger for ships anchoring in Karrakatta Bay; shoal water, with depths of from 4 to 5 fathoms, extends about 800 yards northward from Home Patch.

A patch, with a least depth of $3\frac{3}{4}$ fathoms, lies 076° 1.1 miles from Home Patch in the approach to Pearl Pass; a patch of 3 fathoms lies nearly midway between this patch and Apex Island to the southward.

5-94 Coast.—From Whimbrel Point the coast forming several small bays, fronted by mangroves and separated by rocky points, trends southward and eastward for 2.5 miles to One Arm Point, which is low and sparsely wooded.

Malumbo is a native encampment situated in a bay 1.5 miles westward of One Arm Point.

Extensive reefs front the coast between Whimbrel Point and One Arm Point, fresh water can be obtained by digging above the highwater line.

Malumbo Anchorage is an opening in the reef with depths of from 5 to 7 fathoms, situated 1,500 yards northward of Malumbo. It is available only for vessels with local knowledge.

Middle Island, 66 feet high, is the largest of a small group of rocky islets, fringed with mangroves, standing close together on a reef 1,800 yards long and 1,000 yards broad, and is situated 500 yards southeastward of One Arm Point, northern shore of King Sound, and in the southern entrance to Pearl Pass.

Cygnnet Hill, a conspicuous sand hill covered by scrub, is 119 feet high, and situated 1.5 miles southwestward of One Arm Point.

5-95 Coast.—From one Arm Point a sandy coast, fronted by rocky ledges to a distance of 1,500 yards, extends 3 miles in a southwesterly direction to Shenton Bluff. At about 1,500 yards southwestward of Middle Island patches of 1 to $2\frac{1}{2}$ fathoms extend about 1,500 yards offshore, the outer of which bears 235° 1,600 yards from the summit of Middle Island. Between these and Shenton Bluff the shore is foul in places

out to the edge of the 3-fathom curve, a patch which dries being close within its edge, the 5-fathom line extending for nearly 1 mile from the shore.

5-96 Pearl Pass is the narrow channel available for small craft with local knowledge, connecting Karrakatta Bay with King Sound; it is situated between the reefs upon which stand Apex and Jackson Islands, dividing it from Escape Pass, and those fronting the shore between Talboys Point and One Arm Point.

5-97 Apex Island Group ($16^{\circ}24' S.$, $123^{\circ}03' E.$, *H. O. Chart 3597*), 5 feet high, Talboys Island, 10 feet high, and Howard Island, 3 feet high, are small, flat, grassy islets situated on the northern part of an extensive reef, separated from that extending northwestward from Jackson Island by Pancake Passage, a narrow but deep channel available for small vessels with local knowledge.

Apex Island is on the eastern side of the northern entrance to Pearl Passage.

The eastern side of Pearl Pass, southward of Pancake Passage, is formed by the islands and reefs 3.5 miles in length by 1.5 miles in breadth, which separates Pearl Pass from Escape Pass.

The reef for 1.5 miles southward of Pancake Pass to Waterlow Islands uncovers at about half ebb, and has on its rocks from 2 to 26 feet high.

5-98 Waterlow Islands, three in number, lie on the edge of this flat abreast One Arm Point on the western side of the pass; the southern one is 39 feet high, the middle 57 feet, and the northern 25 feet high. At high water a narrow channel, through which the tidal currents run strongly, separates Waterlow Islands and the reef northward of it from that on which Jackson and Leonie Islands are situated, barred in two places, as charted.

Tyra Island, 96 feet high and conspicuous Holtham Island, 37 feet high, and Livingstone Island, 44 feet high, are three rocky islands close together, situated on the reef extending southeastward of Waterlow Island and southward from Jackson Island and abreast Middle Island in Pearl Pass entrance.

5-99 **Escape Pass**, the entrance to which lies about 3 miles southeastward of Swan Island, is not less than 1,000 yards wide, is deep, and is the shortest route into King Sound from seaward. It is 4.5 miles in length and fairly straight, and presents no great difficulty, other than the strength of the tidal currents, to a small vessel well under command, but local knowledge is considered advisable.

The entrance lies between Rees Islet and reef on the eastward and Dickie Rock and reef on the westward, with Foal Rock, a patch of $3\frac{3}{4}$ fathoms, on the eastern side of the fairway.

Dickie Rock is situated near the northern end of a reef 1,200 yards in length, situated at about 1,400 yards northeastward of Howard and Talboys Islands, which islands are with Apex Island on the reef separating Escape Pass from Pearl Pass. Foul ground extends 400 yards northward of Dickie Rock, which dries 19 feet.

5-100 **Rees Islet** ($16^{\circ}23' S.$, $123^{\circ}06' E.$, *H. O. Chart 3597*), 22 feet high, eastern side of the entrance, is situated on the southern extremity of a reef 1,000 yards in length northward and southward, with a rock 15 feet high on its northeastern extremity and one 12 feet high on its southeastern extremity. This reef is nearly connected with that extending westward from Salural Island.

A 5-fathom patch lies about one-fourth of a mile westward of Rees Islet.

Foal Rock, with a depth of $3\frac{3}{4}$ fathoms and steep-to, lies west-northwestward 1,150

yards from Rees Islet; the fairway channel is westward of it.

Gammon Bank, with a least depth of $6\frac{1}{2}$ fathoms, lies in the northern approach, and is marked by heavy overfalls at times; it lies 1 mile north-by-eastward of Dickie Rock.

5-101 **Jackson Group**.—Southeastward of Dickie Rock the western side of the pass is bordered by the Jackson Island Group, the northwestern of which is Leonie Island, 26 feet high, flat and covered with grass; the reef connecting these islands has several rocks from 1 to 15 feet high on it.

Jackson Island, 88 feet high, is 1.7 miles in length, eastward and westward, and the largest of the group. It is rugged and partially covered with grass, the hillocks being bare and rocky. The bights on its western side are fronted by mangroves, and the reef extends for 1,500 yards to Tyra and Holtham Island, which form the southeastern side of entrance to Pearl Pass.

5-102 **Tallon Island**, 101 feet high, very rocky, and covered with scrub, forms the eastern side of Escape Pass, with Hadley Pass circling around eastward of it. The island is 1.5 miles long in a northward and southward direction. The northern and southern sides are cliffy, while the eastern side is fronted with mangroves. A reef, with rocks drying from 3 to 8 feet on its edge, extends 1,000 yards westward of its northern half, with Rat Islet, 46 feet high, on its northern edge. A patch of 5 fathoms lies west-northwestward 800 yards from the western extremity of Rat Islet.

Reef extends about 1 mile from the eastern side of the island with rocks drying from 16 to 22 feet on its extremity, forming, with Dingo Rock, about 400 yards off the reef, the western side of Hadley Pass.

Whirl Islet, 24 feet high, lies close off the eastern extremity of Jackson Island; a

sunken rock with 3 feet of water over it lies close off its northward side.

Evans Rocks, situated 1,500 yards southward of Whirl Islet, are a small group of bare rocks from 14 to 27 feet high, standing on the same reef.

Shoal water extends 300 yards southward and eastward of the reef.

Foul ground, on which are two islets 12 and 15 feet high, respectively, connects Evans Rocks with the southeastern side of Jackson Island.

5-103 Hancock Island, 87 feet high, on the eastern side of the pass and abreast Whirl Islet, distant 1.3 miles, is 1 mile long in a northeastward and southwestward direction and 500 yards broad, connected at its northeastern extremity with West Sunday Island by a ridge of rocks which covers at high water.

Reef extends 1,400 yards southeastward of its southwestern extremity, on which rocks dry 20 feet; it also fills the bay eastward of the island, in which are rocks from 28 to 55 feet high.

Direction Islet, 30 feet high, lies 1,000 yards northward of the southwestern end of Hancock Island, on the reef which extends 600 yards southward of Allora Island, and nearly connected with Hancock Island Reef.

Lalowan Island lies 700 yards southwestward of Hancock Island and in the southeastern part of the entrance to Escape Pass. It is 46 feet high and fairly steep-to on the pass side.

Lone Rock, 6 feet high, is situated on the outer edge of the reef extending 1 mile southeastward of the western extremity of Hancock Island. Daniel Rocks are situated 800 yards westward of Lone Rock, with depths of 2 to 3½ fathoms and steep-to.

5-104 Hadley Pass, northward and eastward of Tallon Island, and southward of

Salural and Poolngin Islands, is entered from either end of Escape Pass; its least breadth is 900 yards and the least depth about 10 fathoms; there seems no object in using it.

Dingo Rock (*16°25' S., 123°08' E., H. O. Chart 3597*), the only danger, has a least depth of 5 feet, and lies about 400 yards off Tallon Island Reef and 1.1 miles south-south-eastward of the northeastern extremity of that island.

5-105 Allora Island, 148 feet high, a rugged, deeply indented island 1.5 miles in length northward and southward, forms the eastern side of Hadley Pass and is situated on the western edge of the coral reef extending from the wide bay in the western side of West Sunday Island. Two conspicuous crags, 103 and 117 feet high, respectively, are situated in the southern portion of the island; the northern of these crags is white.

Reef extend 1,400 yards southeastward of Direction Islet, before described, is situated on the reef extending southward from the island.

The Pool is a narrow inlet in the reef between Direction Islet and Hancock Island, affording good boat anchorage abreast a rock 10 feet high, as charted.

5-106 Channel—Kolganu Island, 123 feet high, is situated on the same reef as Allora, which reef extends 600 yards westward of the northwestern extremity of West Sunday Island, with a narrow channel between it and Poolngin Island leading from Meda Pass into Hadley Pass, and referred to with Poolngin Island below.

5-107 MEDA PASS, about 6 miles in length and not less than 1.3 miles in breadth, is the channel leading from abreast Swan Island to the northern entrance of King Sound, between Salural, Poolngin, and Sun-

day Islands on the southward and the Roe Islands on the northward.

The only danger in the fairway is Hadley Rock, but this pass is preferred to Sunday Strait by many navigators for entering King Sound, as the tide rips are less violent.

Hadley Rock ($16^{\circ}23' S.$, $123^{\circ}12' E.$, *H. O. Chart 3597*), with 5 fathoms of water over it lies in the center of Meda Pass 204° distant 1,100 yards from the eastern extremity of West Roe Island.

5-108 Southern shore.—Rees Islet, the westernmost, has been described with Escape Pass.

Salural Island, a rocky, irregularly shaped island, 1,500 yards long, 70 feet high, and surrounded by a fringing reef, is situated nearly 1 mile eastward of Rees Islet. The reefs extending from these islands are separated by a narrow channel perhaps available by boats.

Salural Island at high water is divided into two parts, and on the surrounding reef are situated several rocky islets; on the northern edge of the reef is Imp Island, 20 feet high.

Poolngin Island, rocky, 114 feet high, and about 1 mile in diameter, is surrounded by a fringing reef; its reef on the northwestern side is separated from Salural Island Reef by a narrow channel encumbered with reefs.

Channel.—Between Poolngin Island and the northwestern extremity of West Sunday Island is a deep channel 150 yards broad, through which the tidal currents run with great velocity; the fairway of the northern entrance is obstructed by a patch of rocks having depths of less than 6 feet.

5-109 The tides and tidal currents in King Sound and western approaches are described below. (*See H. O. Charts 3420 and 3597.*)

Tides.—It is high water, full and change, in Karrakatta Bay at 0h. 26m.; springs rise

22 feet 3 inches, neaps 15 feet 3 inches; and in Meda Pass, on the northern side of Sunday Island, at the same time, with a spring rise of 21 feet 10 inches and a neap rise of 16 feet 4 inches.

At Lugger Cove, northwestern side of King Sound, at 1h. 38m., with a spring rise of 23 feet 3 inches.

High-water interval at Cone Bay is 0h. 35m.; mean range 16 feet 6 inches, springs rise 25 feet 8 inches.

The maximum equinoctial spring range was found to be 5 feet 6 inches greater than the mean spring range, such maximum occurring at the spring tide following the equinox.

The tidal currents in Meda Pass run from 4 to 8 knots, flood eastward and ebb westward, somewhat less than in Sunday Strait, where they run from 5 to 10 knots.

The tidal currents set through the northern part of Escape Pass at the rate of 5 to 9 knots, the flood southeastward and the ebb northwestward, and in the southern part between Jackson and Tallon Islands at the rate of 6 to 10 knots, turning at about $1\frac{1}{2}$ hours after high and low water by the shore. Whirls are formed around Whirl Island, which are dangerous to small craft.

Northward of Cape Leveque and Swan Point the flood or eastgoing current sets directly toward Escape Pass; and from midway between Swan Point and Twin Islets it sets toward and sweeps the northern shores of Roe and Sunday Islands.

In Sunday Strait, Meda, Escape, and Hadley Passes the tidal currents turn at about $1\frac{1}{2}$ hours after high and low water in Sunday Strait and Karrakatta Bay. On the eastern side of Sunday Strait, near Mermaid Island and among the islands eastward of that island, the currents change at about 2 hours after high and low water. Northward of Cape Leveque, during easterly winds,

such change occurs at from 15 minutes to 1½ hours before and during westerly winds at similar intervals after high and low water.

At a position 2 miles northward of the Twin Islets the flood current sets eastward until Sunday Strait is open, bearing south-eastward, when it sets toward that strait, increasing in velocity until between Roe and Tree Islands it attains a rate of from 5 to 10 knots, causing heavy races and overfalls over the ridge upon which Menmuir Rock is situated.

From Menmuir Rock the main current, with reduced velocity, sets southward through the fairway of the sound, but a portion sets southwestward and, joining the current which has entered through Escape and Pearl Passes, follows the curve of Cygnet Bay to Cunningham Point, off which it rejoins the main current nearly at right angles, causing a heavy race.

Throughout King Sound the greatest strength and rise of tide generally take place on the third day after new or full moon, when the tides become fairly regular, but afterwards there are intervals of three or four days when, owing to the large diurnal inequality, little or no difference is observed in the times of high water until full or change day again approaches, when a difference of two hours and a half in one day has been observed.

In Escape Pass the tidal currents run with a velocity of from 6 to 10 knots.

In the fairway of King Sound the velocity is about 5 knots, increasing near the western side to from 6 to 7 knots; off Torment Point the rate is from 3 to 4 knots.

At about 8 miles westward of Port Usborne the flood sets east-southeastward toward Stokes Bay, and a sailing vessel bound to Fitz Roy coming within its influence will experience much difficulty in doubling Torment Spit. Between Torment

Point and Mary Isles the flood sets from south-southeastward to southeastward, ceasing at high water.

The ebb current sets, generally speaking, in the opposite direction to the flood, except on the eastern side of Sunday Strait, close to Tree Island, where, after passing Hancock Reef, it splits, one portion setting to the northward between Salier Islands and the eastern islands of the Tide Rip Group.

From a position 1 mile eastward of Sunday Islands the ebb current sets toward the southern side of East Roe Island.

On the third day before new and full moon the ebb current was found to run from 7 to 7½ hours.

In Meda Pass the tidal currents set fairly through the channel, the flood current inclining toward the southern side and the ebb toward the northern side; at springs the flood current attains a velocity of from 4 to 8 knots, but the tide rips are not so heavy as those in Sunday Strait.

5-110 Directions—King Sound from the westward (*H. O. Chart 3597*).—A knowledge of the set of the tidal currents, as above described, is essential for the safe navigation of the approaches to King Sound and to Fitz Roy Estuary at the head of the sound, both for steam and sailing vessels; the latter can only enter with the flood or in-going current, and should endeavor to make Sunday Strait at low water.

At night or in thick weather Cape Leveque should not be approached within a depth of 20 fathoms.

A vessel approaching from the westward, and intending to enter northward of Alarm Shoal, should pass 6 miles westward of Cape Leveque, steering about 035° until Cape Leveque Lighthouse bears 153° and the summit of Swan Island 108°, when the Southeast Twin Island should bear 089° (scarcely in sight from the deck at high water), then

alter course for it on that bearing, passing between Alarm and Pitt Shoals.

Keep this bearing on until Whirl Islet is seen in the middle of Escape Pass, bearing 142°.

5-111 If proceeding through Escape Pass into King Sound, steer with Whirl Islet bearing 142° and follow the directions given for the pass given below; local knowledge is advisable for its safe navigation.

5-112 If bound through Escape Pass from abreast or a little eastward of Swan Point, Whirl Islet at the southern extremity of the pass will be seen through the pass bearing 142°, which bearing being preserved will lead through the entrance eastward of Dickie Rock; the summit of Leonie Island in the northern part of the pass, bearing 171°, is also a good mark, and leads more in mid-channel between Dickie Rock and Foal Rock. When within those dangers proceed in mid-channel, passing into the sound midway between Lalowan Island and Evans Rocks.

Entering the pass from King Sound, during the north-going current, Whirl Island must be passed close to in order to avoid being set into Hadley Pass.

5-113 If bound through Meda Pass, which is the recommended and safest route, with Whirl Islet bearing as above, or the summit of Swan Island bearing 155°, steer for the summit (160 feet) of the eastern Sunday Island bearing 120°, for the entrance to that pass, remembering that the flood current sets toward its southern side. When the western extremity of West Roe Islands bears 025° steer through the fairway on either side of Hadley Rock, round Sunday Island at a distance of 1,500 yards, and after passing Rip Rock steer up the sound, observing that the eastern extremity of the Sunday Islands bearing northward of 348° leads well westward of Amur Reef and Alert Rock.

If approaching from the southward, and desirous of entering between Cape Leveque and Alarm Shoal, which from the survey is the shortest route, give the cape a berth of about 2 miles, and steer for the summit of Swan Island, bearing 086°, until Cape Leveque Lighthouse bears 242°, which bearing, kept on astern, leads between Karrakatta Rock and the eastern end of Alarm Shoal, in about 10 fathoms of water. (The summit of Southeast Twin Islet bearing 049° ahead, also leads between Karrakatta Rock and Alarm Shoal.) When Whirl Islet, in Escape Pass, bears 142° true, steer for it if intending to use this pass, or for Meda Pass as above directed.

On account of the strong tidal currents in this channel off Cape Leveque, which cause a tide race some 7 miles in length, it is stated to be hazardous for small craft not fully under command, and only to be used by those thoroughly acquainted with it.

5-114 If bound through Sunday Strait, the longest route, northward of Meda Pass and of the Roe Islands, from a position northward of Alarm Shoal, and with Southeast Twin Islet bearing 089° and Whirl Islet bearing 142°, a vessel should steer to pass nearly 1 mile southward of Southeast Twin Islet, whence the summit of High Island should be brought to bear 105°, and steered for on that bearing, guarding against the southerly set of the flood current.

When the eastern extremity of Sunday Island opens eastward of East Roe Island, steer to pass at 1,000 yards eastward of East Roe Island and 1,500 yards eastward of Sunday Island in order to avoid Menmuir Rock.

After passing Rip Rock close off East Sunday Island proceed up the sound with the eastern extremity of the Sunday Islands bearing northward of 348° to avoid Amur Reef, and when abreast of Fairway Islands

course may be shaped for Derby (*H.O. Chart 3420*) at the head of the sound.

Port Usborne, on the eastern side, affords safe anchorage, and the bays northward of it since they were surveyed have been found available.

Directions for Derby and the estuary of the Fitz Roy will be found in section 5-154.

5-115 Eastern shore of King Sound (*H. O. Chart 3420*).—Coast continued from previous pages.

From Whirlpool Pass the coast trends in a southeasterly direction for a distance of 8 miles to Strickland Bay.

5-116 The Graveyard ($16^{\circ}20' S.$, $123^{\circ}38' E.$), so called from the large number of pearl divers who have lost their lives there when fishing for pearl shell, is a large lagoon, the northern entrance to which lies 5 miles southeastward of Chambers Island. It has two deep but narrow entrances, 2.5 miles apart, at either end of Aveling Island, which is 390 feet high. The water quickly shoals within the northern entrance, but depths above 14 fathoms will be found for 1,500 yards within the southern entrance, the channel then trending in an easterly direction for about 2 miles, with depths of $4\frac{3}{4}$ to 8 fathoms, over a bottom of mud, shell, and coral. Within the passage, at this distance, the water shoals, as charted.

There are numerous islands in the lagoon from 145 to 397 feet high, mostly connected by reefs. Within these islands the Graveyard is 8 miles in length by 1,000 yards to

1 mile in breadth, the shores being fronted by mangrove flats, leaving only a narrow channel with depths of 1 to 2 fathoms, and many patches of less water. Two miles from the southeastern corner a narrow arm extends inland to a large mangrove swamp, about 2 miles in extent, dry at low water.

5-117 Steep Head ($16^{\circ}18' S.$, $123^{\circ}31' E.$) is the southern extremity of Dunvert Island, situated on the eastern side of the southern entrance of Whirlpool Pass. It is a remarkable rocky mass, rising abruptly from the sea to an elevation of 292 feet; its gray cliffy face, together with the remarkable column-shaped rocks scattered over its level summit, gives it the appearance of an old turreted fortress.

5-118 STRICKLAND BAY.—The southern end of Hidden Island forms the northern entrance point of the bay, and is situated about 1.5 miles northwestward of Steep Head. From Steep Head the bay extends for about 12 miles in a southeasterly direction and is 4 miles wide between Steep Head and the largest of the Mary Islands to the south. The shores, generally steep and cliffy, are indented by several coves, and obstructed in places by reefs. The bay is divided into two parts by a chain of islands extending in a northwestward and southeastward direction.

The best approach to Strickland Bay is apparently from either side of the long reef and on which are Shirley, Dorney, and Tyrer

Islets, but no directions are available other than what can be obtained from the chart.

Vickery Reef, in its approach, is described with the inshore channel islands and dangers previously in this chapter. There are so many dangers in this locality that it would only create confusion to attempt to describe them all. See the chart.

5-119 Cecilia Islands, 3 miles southeastward of Steep Head and the northwestern of the dividing chain of islands are a group of nine small islets from 18 to 83 feet high, situated on a reef which extends 1.5 miles in a northwestward and southeastward direction.

A group of three small islets, the largest of which is 87 feet high, lies 1,200 yards westward of the northern of the Cecilia Islands; a circular island, 400 yards in diameter and 173 feet high, at 1 mile west-southwest of the southern of that group, and a shoal of 5 fathoms at 900 yards south by east from the same point.

A rocky patch, 700 yards long and 500 yards broad, marked on the steep northern edge by a rock which dries 15 feet, is located west-southwestward of and is separated from the island 173 feet high by a channel 800 yards broad.

5-120 Edeline Islands, separated from Cecilia Islands by a channel 1,000 yards broad, consist of two islands lying northward and southward of each other and separated by a narrow channel which dries at half tide.

The northern island, 180 feet high, is 1.7 miles long and from 200 to 600 yards broad; a reef, which dries, extends from the northwestern extremity, upon which are situated two narrow islands, 500 and 700 yards long, respectively, the northwestern of which is 110 feet high.

A narrow island, 1,200 yards long and 179 feet high, with a reef extending 600 yards

northwestward from it, is situated 500 yards southwestward of these islands.

The southern of the Edeline Islands is 154 feet high, 1,400 yards long, and 600 yards broad, with reefs extending 1,400 yards in a northwesterly direction from its western extremity; a reef with a small islet and patch which dries upon it extends 1,000 yards southeastward from its southeastern extremity.

A small reef, which dries 1 foot, lies about three-fourths of a mile westward of the western extremity of the 154-foot islet.

A narrow islet, 400 yards long and 162 feet high, is situated 1,000 yards northeastward of the center of Edeline Islands; a shoal of 4 to 5 fathoms lies between it and Aveling Island.

5-121 Henrietta Islands, separated from Edeline Islands by a channel 1,600 yards broad, are two long narrow islands connected by a belt of mangroves.

The western island, 220 feet high, is about 1.5 miles long and 600 yards broad; a reef, upon which is a rock about 10 feet high, fringes the northwestern extremity; several rocks, which dry from 4 to 16 feet, and a rock with less than 6 feet, are situated within one-half of a mile from the northern side of this island.

The eastern island, 210 feet high, is 1.3 miles long and 600 yards broad.

5-122 Coast.—Above Henrietta Islands, Strickland Bay is entirely obstructed by foul ground and mangrove swamps; the shores are cliffy, rising in steep slopes to hills from 300 to 500 feet high.

Tidal currents.—The tidal currents in Strickland Bay, southward of the chain of islands, are not strong, but northward of Edeline Islands both currents run strongly.

Anchorage.—Vessels can anchor in depths of from 5 to 9 fathoms, mud bottom, over any part of Strickland Bay southwestward

of the chain of islands. The area with depths of more than 5 fathoms southward of Henrietta Islands is very limited.

5-123 **Gerald Island** ($16^{\circ}25' S.$, $123^{\circ}36' E.$, *H. O. Chart 3597*), 395 feet high, at the northeastern end, with irregular ridges of hills, is 4.5 miles long and 1.3 miles broad; it is situated 2 miles south-southwestward of Edeline Islands, and forms the northern side of a long and narrow shoal inlet between Strickland and Cone Bays. The northern coast of Gerald Island is high and cliffy.

An island, 420 feet high, is separated from the eastern side of Gerald Island by a narrow channel encumbered with rocks, and from the mainland by a passage 100 yards broad.

An island, 260 feet high, 1.5 miles long, and 1,000 yards broad, is separated from the western end of Gerald Island by a narrow channel which dries at low water; from the western point of this island a reef, upon which stands a chain of small islets and rocks, extends rather over the distance of 1 mile; southward of this reef is an islet 35 feet high.

Rocks.—An islet 130 feet high, on the eastern part of a reef, is situated 800 yards southward of the southwestern extremity of the island 260 feet high; a reef, with rocks above water, extends a distance of 1,500 yards northwestward of the islet.

5-124 **Mary Islands** are the continuation northwestward of Gerald Island and the islands westward of it, southern side of Strickland Bay. They lie parallel to the islands just described, and extend a distance of 1.8 miles in an east-southeastward and west-northwestward direction; foul ground extends 1,200 yards eastward from the group, and the same distance northward of the western point of the largest and westernmost island, which is 140 feet high.

Reefs.—A cluster of rocks, drying 8 feet, is situated 1 mile 125° from the eastern extremity of Mary Islands; a shoal of $4\frac{3}{4}$ fathoms lies 1.4 miles 013° from this cluster, and patches of $4\frac{3}{4}$ fathoms at 1,500 yards northeastward of them.

A 5-fathom patch lies about $11\frac{1}{4}$ miles east-northeastward of the southeastern extremity of the larger Mary Island.

A reef, upon which are rocks drying 2 feet, is situated in the fairway between Mary and Edeline Islands, with the eastern extremity of the large Mary Island bearing 275° 2.8 miles.

Between this drying reef and the cluster of drying rocks located 1 mile southeastward of Mary Islands, there are two $4\frac{3}{4}$ -fathom patches.

A narrow ridge, with depths of from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms, is situated 1 mile northwestward of the western extremity of Mary Islands, and a rock with less than 6 feet of water over it, lies 334° nearly 1 mile from the same point.

A reef, 1 mile long and 1,000 yards broad, upon which stands a group of small rocky islets from 33 to 80 feet high, is situated southwestward of Mary Islands; between them and Split Rock is the channel mentioned with the latter previously in this chapter.

A reef which dries 1 foot and is 800 yards long and 200 yards broad is situated 500 yards southward of the above reef, and 1,700 yards northeastward of Cussen Island.

5-125 **CONE BAY** (*H. O. Chart 3597*), so named from a conspicuous conical hill, 593 feet high, situated at the head, is 3.3 miles broad at the entrance and 12.5 miles long in an east-southeastward and opposite direction, and from Sir Richard Island to the head of the northern of the two bays at the eastern end.

Sir Richard Island, situated off the northwestern entrance point of Cone Bay, is a steep, cliffy island 1.8 miles long in an eastward and westward direction, and 700 yards broad.

The summit, 326 feet high, rises over the eastern end, from which the hills slope to a long, narrow point at the western extremity.

A small island, 58 feet high, is situated about 1 mile northeastward of the western extremity of Sir Richard Island, and two small rocks, 10 and 11 feet high, are situated in the same direction, on the shore reef, at 1,200 yards and 1,500 yards, respectively, from the same point.

A channel about 300 yards broad, which dries at low water, separates Sir Richard Island from the mainland.

Cone Rock, 47 feet high, lies 800 yards westward of Sir Richard Island; the space between is almost blocked by reef.

Bank.—A bank, with depths of from $5\frac{1}{2}$ to $9\frac{1}{2}$ fathoms, is situated 1 mile southward of the western extremity of Sir Richard Island.

Herald Rock, situated 2.8 miles southwestward of Sir Richard Island, dries 21 feet; it is described on a previous page in this chapter.

Datum Bay, 500 yards wide at the entrance, and which recedes about the same distance, is situated 1,000 yards eastward of Sir Richard Island; it is only available for boats, as it dries over the greater part of its extent at low water.

5-126 Northern shore.—At nearly 2 miles eastward of Datum Bay is the narrow entrance of an inlet dry at low water, and which expands into a bight about 1,200 yards long and 400 yards broad; a bluff, westward of which is a rock 16 feet high, is situated 1.3 miles eastward of this inlet.

From Sir Richard Island to a position 3 miles eastward of this bluff the coast is

cliffy and steep; it then becomes more indented and slopes more gently for 3.3 miles to the head of the bay, which is sandy.

The head of Cone Bay is divided into two arms by a peninsula 4 miles long, the northern side of which is much indented, and off the western extremity of which are situated a group of small islands from 60 to 131 feet high, extending about 800 yards from the shore, with shallow water around them.

5-127 South shore.—The arm on the southern side of this peninsula is 5.8 miles long in an eastward and westward direction and from 800 to 1,600 yards broad, with a small triangular island, 60 feet high, in the northern part. The shores are lined with mangroves, which obstruct the head. A narrow inlet, which dries at low water, is situated on the southern side of this inlet westward of a rocky bluff; the southern shore is cliffy and precipitous.

Porter Hill, 637 feet high, is the highest summit on the southern side of Cone Bay; fresh water may be obtained in most of the gullies northward of this hill.

5-128 Razor Islands.—This group of four islands on the northern side of Cone Bay, extending in an east-southeastward and west-northwestward direction, is situated about 3 miles southeastward of Sir Richard Island.

The eastern and largest of the group is 188 feet high, 1,600 yards long, and 200 yards broad; the western and smallest is 50 feet high, with a small rock above water close northwestward of it.

Rocks.—A rock, which dries 5 feet, is situated 1 mile 103° of the eastern extremity of East Razor Island, and a rock, with less than 6 feet, at 1,400 yards 145° of the same point.

5-129 Islands.—A group of small rocky islets, extending 1,000 yards in a northwestward and southeastward direction, and of which the largest is 87 feet high, is situ-

ated in the northern arm, at 2.5 miles east-southeastward of East Razor Island.

An island, 60 feet high, 500 yards long in a northwest and southeast direction and 300 yards broad, is situated near the southern shore at 1 mile northeastward of Porter Hill.

Shoal.—A shoal, with a depth of 3 fathoms, extending 1 mile in a northward and southward direction and 2.3 miles in length, is situated northward of Porter Hill; on the southern side of this shoal a rock which dries 2 feet lies 017° 1.3 miles from Porter Hill. For other shallow patches see the chart.

5-130 Anchorage.—Vessels can anchor in Cone Bay in a depth of 10 fathoms with the eastern extremity of Sir Richard Island bearing 351° and the summit of East Razor Island 109°.

5-131 Directions.—The entrance to Cone Bay from the westward, from abreast Sunday Strait, lies between High and Tree Islands, and is deep; the only danger being Way Rock, with less than 6 feet of water, situated on the southern side of the fairway, southward of Margaret Island. The center of the square-topped hill, 614 feet high, at the head of Cone Bay, in line with the summit of Razor Islands, bearing 111°, leads in between Margaret Island and Way Rock to the anchorage southward of Sir Richard Island, passing about midway between Way Rock and the foul ground of 3½ fathoms, southward of Folly Island.

The northern and southern approaches, by Whirlpool Pass and Hell's Gates, respectively, are only available by small craft under full command, and by those thoroughly acquainted with them.

5-132 Crawford Bay, the entrance to which is 2 miles wide, is 3 miles long, and separated from Cone Bay by a peninsula 1,500 yards broad, and 3 miles in length, at

the eastern end of which is situated Porter Hill.

An islet or rock, 11 feet high, is situated 800 yards southward of the western extremity of this peninsula; a patch of 1½ fathoms lies 300 yards northwestward of it.

A rocky flat, which dries, extends nearly 2 miles from the head of the bay, almost filling it, upon which are three islands, the outer and largest being 143 feet high.

The southern shore of Crawford Bay is formed by precipitous cliffs from 200 to 400 feet high, fronted by a sand flat and coral reef.

5-133 Faint Point (16°30' S., 123°26' E., *H. O. Chart 3420*), the southwestern entrance point, is the eastern extremity of a narrow peninsula 78 feet high, within which is a shallow inlet.

Two rocks, awash, lie westward of the elbow of Faint Point, 250 and 1,800 yards, respectively, between which is Hell's Gates. A coral patch, which dries 3 feet, lies 700 yards northward of the latter rock. For other rocks, see the chart.

Reef.—A reef, 1,200 yards long in a north-eastward and southwestward direction, and which dries 6 feet at the southern end, is situated in the western approaches to Crawford Bay, and between 1,500 yards and 1.3 miles southwestward from the eastern extremity of Greenhalgh Island. A coral patch, drying 3 feet, with shoal water for a distance of 200 yards around, lies 1,600 yards westward of this reef, and a rock with less than 6 feet at about 800 yards northwestward of the same reef.

5-134 Coast.—At about 1,000 yards southward of Faint Point the coast trends eastward for 3 miles, forming a bay completely obstructed by coral reefs, in which is Pecked Island, described with islands and dangers between it and Pasco Island, in

Hell's Gates in previous sections of this chapter.

5-135 CASCADE BAY ($16^{\circ}35' S.$, $123^{\circ}27' E.$, *H. O. Chart 3420*), southward of Cone Bay, and eastward of Long Island Shoals, is 5 miles wide and about 4 miles long. The southern entrance is between an island, 112 feet high, lying close eastward of the southern extremity of Long Island, and Sanderson Point, the western extremity of Lachlan Island about $3\frac{1}{4}$ miles northwestward of Point Usborne. The entrance is about $2\frac{1}{2}$ miles wide with depths of from 8 to 16 fathoms in the fairway. A drying reef extends about $\frac{1}{2}$ mile eastward from the eastern end of the 112-foot island.

Long Island Shoal extends north-northwestward about $3\frac{3}{4}$ miles from a position about $\frac{3}{4}$ mile northeastward of the eastern extremity of the 112-foot island. The shoal is narrow and dries 1 to 2 feet in places. A detached 1-fathom patch and a small drying reef lie close off the fringing reef about $1\frac{1}{4}$ miles north-northeastward of the southern extremity of Long Island.

Between the two large islands at the head are narrow passages leading to an extensive lagoon, encumbered by rocks and shoals; this lagoon communicates with Port Usborne by a deep narrow passage through which the currents rush with great velocity.

Although Cascade Bay may be difficult of access, it appeared less so than any of the bays between it and Yampi Sound, as it seemed impossible for a vessel to thread her way with safety through the numerous islets, rocks, and shoals fronting those bays, independently of the tidal races and shifting winds, which form the ordinary dangers of such navigation.

Shoals.—A coral reef, which dries 4 feet, is located about 3 miles west-northwestward of Usborne Point, and a shoal ridge with a least depth of $1\frac{1}{4}$ fathoms in the middle extends about $1\frac{1}{2}$ miles northwestward from a position about 1 mile west-northwestward of Usborne Point.

5-136 Port Usborne ($16^{\circ}39' S.$, $123^{\circ}31' E.$) is a small anchorage at the southern extremity of the islands close northward of Usborne Point. This convenient little harbor is about 1,000 yards in extent, with depths under 3 fathoms within the entrance point, and from 5 to 15 fathoms outside. Its head is nearly filled up by a soft mud flat, thickly studded with mangroves.

Tree Islet, a small, low islet about 1 mile off Usborne Point, is surrounded by a reef, between which and the southern point of the port is a deep passage 1,000 yards wide leading into the anchorage. Towndron Rock, which dries 2 feet, lies almost 1 mile northward of the western end of Tree Islet.

Water.—The shores of Port Usborne rise to rugged sandstone ridges, with densely wooded valleys between, affording evidence of water being plentiful near the anchorage during the rainy season.

Tides.—It is high water, full and change, in Port Usborne, at 1h. 45m.; springs rise 34 feet. The tidal current is scarcely felt.

5-137 Coast.—From Port Usborne the eastern shore of King Sound trends eastward 7 miles to the base of Compass Hill, 700 feet high, and then southeastward 17 miles to Stokes Bay. The first part of the coast is high and rocky, but the last is a low muddy mangrove shore, with a level track of land between it and ranges of hills, extending in a southeasterly direction from Compass Hill. Saddle Hill, about 650 feet high, and Round Hill are conspicuous.

A bank, with 4 fathoms, and possible less, lies southeastward, $3\frac{1}{2}$ miles from Usborne Point.

5-138 Helpman Islets are connected with the shore by a shallow ridge. At 2 miles westward of Helpman Islets is the eastern extremity of a bank 2.5 miles in length, east and west, with depths of $3\frac{1}{4}$ to 5 fathoms, 5 miles south-southwestward of Compass Hill.

5-139 Stokes Bay (*H. O. Chart 3420*) is about 15 miles in length and 8 miles in breadth; its head is nearly dry at low water for about 7 miles and the soft muddy shores

are everywhere fringed with mangroves, through which the tide flows, inundating at spring tides many miles of the interior country. The land around the bay is also low and swampy for a breadth of nearly 3 miles in places, and thence rises gradually, the slope being well wooded with white gum trees.

Meda River discharges into the southeastern corner of Stokes Bay, and is navigable at high water for about 15 miles for vessels of 9-foot draft.

Robinson River is on the eastern shore of Stokes Bay, and traverses the valley between Saddle and Round Hills.

May River in the southern portion of Stokes Bay, 30 miles from its mouth, joins Meda River, and thence takes the name of Lennard River.

The entrances of these rivers appear to be obstructed by sandbars, which probably dry at low water.

Torment Point and Spit ($17^{\circ}00' S.$, $123^{\circ}36' E.$).—Torment Point, the western extremity of Stokes Bay, has a spit, with depth under 3 fathoms, extending about 6 miles northwestward of it; it dries off 3 miles from the point. Compass Hill, bearing eastward of 022° , leads westward of the spit.

Point Torment Creek, a small stream 4 miles eastward of Torment Point, was ascended for 12 miles by boat, where it terminates in a mangrove swamp. No landing could be effected.

Light.—A light is exhibited about 3.5 miles southward of Torment Point.

5-140 Coast—Aspect.—The remaining portion of the eastern shore of King Sound from Torment Point takes a general south direction for about 20 miles to Fitz Roy River. The coast is low, irregular, lined with mangroves, and fronted by mud flats.

A black rock lies nearly 5 miles southward of Torment Point, at about 1 mile from the shore, on the edge of a flat of muddy sand, dry at low water.

At 13 miles southward of Torment Point there rises close to the shore a dark, wooded, conspicuous hillock, about 70 feet high, named Nob Hillock, and 5.5 miles farther southward two similar elevations close together, named Double Nob Hillock; within the latter is the town of Derby.

5-141 Northern and western shores of King Sound (*H. O. Chart 3420*).—Sunday Islands and those westward of them have been described, with the passes that lead between them from seaward, as far westward as Pearl Pass.

Shenton Bluff ($16^{\circ}28' S.$, $123^{\circ}03' E.$).—Southwestward of Middle Island, in the southern entrance to Pearl Pass, is Shenton Bluff, 74 feet high, and the southern extremity of a peninsula extending nearly 1 mile beyond the shore on either side.

5-142 CYGNET BAY (*H. O. Chart 3420*) is the deep indentation between Shenton Bluff and Cunningham Point 14 miles apart; in its northern part are Lugger Cove, Mission Bay, and Catamaran Bay.

The shore is almost everywhere fringed with closely twining mangroves, the country behind gradually rising to an average level of 200 feet, thickly covered with various kinds of gum trees.

Gilbert Rock, 8 feet high, is a small rock situated 1,200 yards southward of Shenton Bluff, with which it is connected by a rocky ledge.

A sand patch, which dries 21 feet, on the same reef, is situated 400 yards westward of Gilbert Rock.

Reefs and foul ground extend 1,000 yards westward of Gilbert Rock, near the western extremity of which there is a rock which dries 8 feet. Within the 5-fathom curve the bottom is foul.

Newman Ledge is a reef 400 yards long in a north and south direction which dries 8

feet, and is situated 1,600 yards eastward of Gilbert Rock.

Shoal water surrounds Newman Ledge to a distance of about 700 yards, and a rock, drying 10 feet, is situated midway between it and Gilbert Rock.

5-143 **Lugger Cove**, situated westward of Shenton Bluff, is much encumbered by a sand flat fringed with coral reefs extending from the head.

Anchorage.—Good anchorage, in a depth of 4 fathoms, sand bottom, is found in Lugger Cove with Shenton Bluff bearing 107° 1,500 yards, avoiding a rocky spit of 2 feet which extends about one-half of a mile westward from that bluff.

Riddell Point (*H. O. Chart 3420*), the western point of Lugger Cove, is 64 feet high, and faced by cliffs; a reef extends 400 yards from this point.

Bird Rocks are a group of small rocks, from 10 to 24 feet high, situated on the outer part of the shore reef at about 1.5 miles south-southwestward of Riddell Point.

5-144 **Mission and Catamaran Bays.**—Between Riddell Point and Bird Rocks the coast recedes and forms two shallow bays, the northern of which is Mission Bay, where there is a house belonging to the Roman Catholic Mission; the southern is Catamaran Bay.

Fresh water can be obtained in Mission Bay.

Skeleton Point, 125 feet high, is a narrow point situated 2.5 miles southward of Bird Rocks, the coast between forming a bay nearly dry at low water.

Awong Rock.—A rocky ledge extends 600 yards northeastward from Skeleton Point, upon the outer part of which is situated Awong Rock, 2 feet high.

Macdonald Rock, 2 feet high, is situated near the outer edge of the reef extending southeastward from Skeleton Point.

5-145 **Shell Bank**, with general depths of from 6 to 8 fathoms, sand and coral bottom, and from 1,000 yards to 1 mile broad within the 10-fathom curve, has been traced for a distance of 6 miles in a southwesterly direction from a position 1,500 yards southwestward of Evans Rocks, entrance to Escape Pass.

The least known depth is $4\frac{1}{4}$ fathoms, situated 2.6 miles 129° from Gilbert Rock; a patch of $4\frac{1}{2}$ fathoms lies 1.6 miles northeastward of this position.

Shoals (*H. O. Chart 3420*).—Eastward of Shell Bank, about 6 miles east-southeastward of Shenton Bluff, commences a series of shoals extending southward off the entrance to Cygnet Bay. A least depth of $4\frac{3}{4}$ fathoms is found about $7\frac{1}{4}$ miles eastward of Skeleton Point. **Meda Shoal**, $5\frac{3}{4}$ fathoms, lies about $7\frac{1}{2}$ miles east-southeastward of Skeleton Point. A $5\frac{1}{4}$ -fathom patch lies about 6 miles eastward of Meda Shoal. Several shoal patches of less than 3 fathoms lie up to 6 miles north-northwestward from Cunningham Point; the least depth charted, 13 feet, is situated about $3\frac{1}{2}$ miles from the point. Many of the shoals are awash or uncover at low water springs.

A reef, which partly uncovers at low water, extends about $5\frac{1}{2}$ miles south-southeastward from Cunningham Point.

Cunningham Point, the southern extremity of Cygnet Bay, is a steep rocky cliff, connected with the mainland by a low narrow isthmus, covered at springs. A rocky ledge, dry 10 feet at low water, extends 1,500 yards northward from the point.

5-146 **Anchorage.**—Most of the bays afford good anchorage in 4 to 5 fathoms, out of the strength of the tidal currents, between 1,000 yards and 2 miles from the shore; but the best for small vessels is in the southern bay, in from 2 to 3 fathoms, within Cunningham Point. The bottom between the sandy ridges and line of points is generally sand, and mud farther in.

5-147 **Coast.**—Carlisle Head, about 3 miles southward of Cunningham Point, is a remarkable cliff.

Goodenough Bay lies between Carlisle Head and Foul Point, and is dry throughout at low water, and foul to some distance beyond the points.

Foul Point ($16^{\circ}48' S.$, $123^{\circ}09' E.$, *H. O. Chart 3420*), fronted southward by a reef to a distance of about 1 mile, falls in conspicuous cliffs; it also marks the southern termination of the range of cliffs on the western side of King Sound.

5-148 **Disaster Bay** ($16^{\circ}54' S.$, $123^{\circ}12' E.$).—From Foul Point to Disaster Bay the coast is mostly bordered by a coral flat dry at low water to the distance of 1.5 miles from the shore.

Spit.—A long narrow sandy spit, which dries 7 feet, extends north by west, about 6 miles from Repulse Point, the southeastern extremity of Disaster Bay. Within this natural breakwater the depth is about 5 fathoms, but the anchorage, until the spit is uncovered, is exposed to the strength of the current, which at springs runs 3 knots or more.

South Meda Shoal, 4 miles eastward of the spit, dries 4 feet at low water with from 4 to 10 fathoms close-to, and is about 1,000 yards in extent. The center of the shoal bears 126° , 10.5 miles from Foul Point.

Valentine Isle, which has cliffs at both ends, bearing more than 180° , will lead eastward of South Meda Shoal.

5-149 **Coast.**—The muddy shore of Disaster Bay is partly backed by hills of drift mud and sand, from 25 to 30 feet high, bound together by coarse wiry grass. Behind these hills a small fresh-water lake was discovered

about 500 yards north-northwestward from a solitary patch of the first low red cliffs seen to the southward of Foul Point.

From Disaster Bay the low coast, with sand hills in places, continues its southeasterly direction for 10 miles to a small inlet, with Valentine Isle 3 miles northeastward, on the eastern edge of extensive flats fronting the shore.

The remaining portion of the western shore of King Sound, from the inlet abreast of Valentine Isle, continues the southeast direction for 18 miles to the western entrance point of Fitz Roy River. It is low, muddy, and lined with mangroves; but the land behind is slightly elevated and thickly wooded with eucalyptus trees. The soil is sandy, and produces several kinds of grass. Between the shore and the shoals extending to the northwestward from the Mary Isles the water is shallow, with numerous patches.

5-150 **Fitz Roy River approach.**—The estuary of Fitz Roy River is about 16 miles wide between Torment Point and Valentine Isle, and within this line is encumbered with shoals; it has not been properly surveyed, and the channel leading to the settlement has altered. Vessels, therefore, should not proceed above Outer Rip Shoal without local knowledge.

A sandbank, which dries 4 feet, lies about $7\frac{1}{2}$ miles west-southwestward of Torment Point.

Shoal.—A shoal with a depth of $2\frac{3}{4}$ fathoms over it, lies about 5 miles westward of Torment Point.

5-151 **North and South Mary Isles** lie between 1 and 7 miles northward from the entrance of Fitz Roy River, and from 2.5 to 4 miles from the eastern shore. The northernmost islet is a narrow strip, 4 miles in length northward and southward, and 35 feet high; the southern islet is 15 feet high, both are covered with mangroves, and are situated on a bank dry at low-water springs, extending 20 miles or more from the entrance of the river. The extremity has not been examined.

5-152 Channel.—The channel into Fitz Roy River passes between the eastern shore and Mary Isles, with a depth varying from 9 fathoms abreast Outer Rip Shoal to nearly dry at about 1.5 miles off Amur Point; it is subject to frequent change.

Outer Rip Shoal dries 4 feet, and has depths of 4 to 7 fathoms close-to. It is 1 mile in extent, and the center is charted 344°, 8 miles from the northern point of North Mary Isle.

Inner Rip Shoal dries 3 to 6 feet, and has, or had, a depth of about 4 fathoms close-to. It is about 400 yards in extent, and is 3 miles within Outer Rip.

Elbow Shoal extends about 5 miles from the eastern shore of the estuary, with depths of 1 to 2 fathoms, over sand bottom.

The bar consists of detached sandbanks uncovering at low-water springs, and extending across the main channel of Fitz Roy River, between the northern end of North Mary Isle and Amur Point.

Range Lights.—The front light, 42 feet high, is shown from a tank located 400 yards southeastward of the head of Derby Jetty. The rear light is shown occasionally from a 60-foot steel tower about $\frac{3}{4}$ mile southeastward of the front light. These lights in range 139° lead over the bar to the jetty.

5-153 Pilotage.—There are no regular pilots at Derby; local assistance can be arranged for in advance.

5-154 Depths.—About 16 feet is available in the approach channel of the Fitzroy at high water. At springs it is reported that a draft of 28 feet can be taken to the jetty at high water. Vessels lie aground at low water.

5-155 Tides and tidal currents.—In King Sound at spring tides there are extensive eddies and overfalls near all shoal and other areas where marked changes in depths occur. With strong winds at spring tides dangerous rips occur in the vicinity of the Fairway Islets, southward and eastward of Long Island, and off Cunningham and Foul Points. Southward of the 10-fathom curve northwest-

ward of Torment Point, the color of the water changes to a dirty yellow, darkening to brown as Derby is approached.

Upon nearing Torment Point the south-going current splits at about 1 mile northwestward of Torment Point, a portion setting eastward into Stokes Bay. At Mary Islets off Derby, the ebb current begins to make at high water, its greatest strength being felt on the western shore of King Sound. The ebb current in the vicinity of Inner Rip Shoal sets westward.

At Derby Jetty springs rise 34 feet and neaps 20 feet. During this period the flood attains a rate of $2\frac{1}{2}$ knots, and sets slightly out from the jetty. The ebb sets directly on the jetty. The water becomes thick with mud and sand.

See section 5-109 for further remarks regarding tides.

5-156 Directions.—Due to the strength of the tides and the number of unmarked dangers, the approach to Derby and the Fitz Roy River demands special care; reference to the tidal currents just described is essential. When clear of Amur Reef and Alert Rock, a vessel should steer about 154° to pass $2\frac{1}{2}$ miles westward of Fairway Islets. Thence to a position about 3 miles westward of Torment Point, avoiding the $2\frac{3}{4}$ fathom patch charted westward of the point. Then steer southward toward the eastern extremity of North Mary Island, and either anchor northeastward of Outer Rip Shoal to await assistance or proceed until Derby light beacons are in range 139°. Local knowledge is necessary for the channels as they alter over a period of time.

5-157 DERBY (17° 20' S., 123° 37' E., H.O. Chart 3420), the capital of the West Kimberley District, is about 2.5 miles southeastward of Double Nob Hillock, where the land rises perceptibly above the swampy ground which extends toward the river. There is a government resident and collector of customs, hospital, police force, etc. Derby is a first port of entry.

It is the outlet for the pastoral and mineral produce of one of the largest and richest districts in the State, and the shipments of wool and cattle are considerable.

The population of Derby is about 150.

Port limits.—Port Derby embraces that portion of King Sound southward of a line joining Saddle Hill and Valentine Isle.

JETTY.—A jetty, 669 feet long, extends from the eastern shore abreast North Mary Islet. It has a length of 245 feet, however, it was reported (1965) that a maximum length of 350 feet could be accommodated at this berth. The berth dries 4 feet but spring tides rise 34 feet and neap tides 20 feet. Vessels using the jetty secure to mooring buoys with bow and stern lines. There is a single line railway connection with the town of Derby. All cargo is handled direct to and from railway trucks by ship's gear. Mobile cranes with capacities of 1 ton to 5 tons are available.

A 500 foot jetty, located close southward of the above jetty, was under construction (1965).

SUPPLIES.—Provisions in small quantities can be obtained at Derby.

WATER.—There is a good supply at the town, and at the jetty at a rate of about 4 tons per hour.

There is air communication twice weekly with Perth.

Telegraph lines connect Derby with the interstate telegraph system.

Vessels communicate with the shore by the International Code.

QUARANTINE.—Vessels are permitted to undergo inspection alongside the jetty until pratique is granted. There is a quarantine anchorage off the head of the jetty between the jetty and the center of North Mary Island.

HOSPITALS.—There are two Government hospitals, one with 6 beds, and the other, for infectious cases, with 4 beds.

WINDS, ETC.—Calms and easterly winds prevailed, with occasional breezes of short duration from the westward (June and July, 1883). Strong breezes (6 to 7), lasting 4 or 5 days, moderating at night, were experienced at times. They began at southeast, veered through east, and ended at northeast; and were foretold by high barometer (30.30 in.); fall in temperature (50°F.); absence of mirage and dew; and a remarkable haze of purple color hung over the land, especially about sunset. A short confused sea is raised by these strong winds.

Cyclones are occasionally experienced in King Sound; in December, 1882, one crossed over Cunningham Point, apparently from eastward to westward, tore down large trees, and left the summit of the point quite bare. They appear to be limited in area; no evidence was seen of their ravages at the mouth of the Fitz Roy and during the cyclone above mentioned vessels at anchor in Beagle Bay, though only 40 miles by land from Cunningham Point, escaped the worst of the storm; and in Roebuck Bay, 100 miles to the southward by land, a low barometer, but no strong wind was experienced.

The average annual rainfall is 24 inches.

5-158 FITZ ROY RIVER (17°20'S., 123°30'E.), at the head of King Sound, is nearly 6 miles wide at the entrance, just above South Mary Isle, whence it gradually contracts to 1 mile in width 10 miles above. It is ap-

parently crossed by a bar, dry at the first quarter of the ebb at spring tides, abreast Escape Point, a low mangrove projection. With the exception of a few holes, there is, at low water, nothing more than a stream draining the extensive mudflats then left uncovered by the tide.

In 1880 the river entrance was so blocked by numerous sand bars as to be unavailable for navigation and was difficult of approach by boats owing to the considerable strength of the tidal current.

The navigation of Fitz Roy River, though still difficult, has been improved by the local authorities by the removal of snags.

The western bank, with an elevation of about 70 feet, is clothed with moderately-sized trees, but on the eastern side the bank is low and bordered with mangroves, the country behind being one extensive and unbroken level, covered with strong wiry grass, and intersected by numerous watercourses filled at high water; there were also traces of greater, but less frequent, inundations from the sea.

At 6 miles above Escape Point the river winds round in a general south-southwest direction for about 6 miles; some low grassy islets about midway extend nearly across the river, leaving only narrow channels barely navigable for a boat at half tide. A rocky point projects from the eastern bank 1 mile above the islets, the river being nearly

500 yards wide, with 12 feet of water. The water is fresh at all times of tide, which here only rises 8 feet—10 feet less than its greatest rise 8 miles nearer the mouth of the river. The country above this point had a more fertile appearance, the eastern bank being thickly wooded.

The course of the river next takes a short bend to the southeastward, and after turning west-northwestward for a distance of 3 miles, sweeps round to the southward for about 9 miles (where the examination was terminated), its navigation thus far having been very difficult, even for boats.

The width of the upper reaches of Fitz Roy River varied from 500 to 50 yards, with from 1 to 14 feet of water, the channel being in many places nearly blocked up by small isles, shallows, and sunken trees. The banks were generally about 20 feet high, showing a fine alluvial soil, covered with rich grass. On the western side was noticed some red coarse-grained sandstone with traces of iron.

The country appeared to improve with the ascent of the river; but drift rushes lodged in the branches of a tree 20 feet above the stream, seemed to show that the country is sometimes deeply flooded.

Some kangaroos, emus, bustards, and various land birds were met with, but fish were scarce in Fitz Roy River.

CHAPTER 6

CAPE LEVEQUE TO NORTHWEST CAPE AND VLAMING HEAD,
WITH OFF-LYING ISLANDS AND SHOALS

6-1 COAST.—From Cape Leveque ($16^{\circ} 23' S.$, $122^{\circ} 56' E.$, *H. O. Chart 3420*) the coast trends south-southwestward for a distance of 8 miles to Chile Head, and is formed by sandy beaches backed by sand hills about 80 feet high, and fronted by rocks and rocky ledges which, off a low red cliff, 4 miles southward of the cape, extend 1.5 miles from the shore.

6-2 Chile Head ($16^{\circ} 30' S.$, $122^{\circ} 51' E.$), formed of boulders, is shaped like an anvil, and a conical hill, 36 feet high, is situated upon it.

Rocky ledges extend $1\frac{3}{4}$ miles northward and $1\frac{3}{4}$ miles southwestward from the northern and southern points of Chile Head.

Thomas Bay, 1.5 miles wide, is a shallow bay with depths of from 1 to 3 fathoms, situated within Chile Head, and well protected by the northern rocky ledges extending from that head, which dry as much as 22 feet; the southern part of the bay dries at low water.

The head of the bay is backed by sand hills from 60 to 80 feet high. A mission station is located close inland at the head of the bay.

Fresh water can be obtained by digging above the high-water line in this bay.

6-3 Packer Island (*H. O. Chart 3420*), 3 miles southwestward of Chile Head, is a narrow island, 4 miles long, separated from the mainland by a mangrove swamp, through which runs a narrow creek, dry at low water; the northern part is known as Lombardina Creek, and the southern part as Tilbata Creek, both being much used by small craft

requiring repairs or shelter; the western coast of Packer Island is low and cliffy.

From the southwestern extremity of Packer Island a narrow rocky ledge, uncovering at low water, extends southwestward for 3 miles; Shag Rocks, 10 feet high, are two rocks, 200 yards apart, situated on this ledge, the southern being 1,200 yards from Packer Island.

Lombardina Point, the northeastern extremity of Packer Island, is a cliffy point, 21 feet high, almost connected with Chile Head by a rocky ledge, protecting the bay within it, which is mostly dry at low water. A 5-fathom patch is charted about $1\frac{1}{2}$ miles northwestward of Lombardina Point.

The entrance to this bay, leading to Lombardina Creek, within Packer Island, is close to Lombardina Point, and has a depth of from 2 to 3 fathoms.

6-4 Coast.—From the northern entrance to Tilbata Creek the coast, fronted by ledges which uncover, curves for 6 miles in a southerly and westerly direction to Cape Borda.

Rocks.—McVilly Rock, which dries 5 feet, is a small isolated coral head, situated 3 miles north-northwestward of Cape Borda with some rocky ledges, which dry and have foul ground around them, between this rock and the cape.

Black Rod Rock, uncovered 2 feet, is a small pinnacle rock, located about 600 yards offshore and about $1\frac{1}{2}$ miles north-northeastward of the southwestern extremity of Packer Island.

A rock awash lies about $35\frac{1}{4}$ miles westward of Cape Leveque.

Lord Mayor Shoal, of irregular shape, and about 3 miles in extent, has general depths of from 6 to 10 fathoms; a small coral patch of $4\frac{1}{2}$ fathoms is situated on the northern edge and lies 248° , distant 18 miles, from Cape Leveque Lighthouse.

6-5 Cape Borda ($16^\circ 41' S.$, $122^\circ 45' E.$), the northeastern extremity of Pender Bay, is a low rocky point with a white sandy patch near the extremity, and backed by red cliffs from 60 to 70 feet high, behind which white sand hills, partly covered by scrubs, rise to a height of 138 feet.

6-6 Pender Bay, entered between Cape Borda and Emeriau Point, is about 10 miles long in a northeastward and southwestward direction, and 4 miles broad; the northern and eastern parts are foul.

Kelk Creek, the inlet at the head of the bay, is available for small craft at high water, with local knowledge; it extends for a distance of 6 miles, but is dry at low water.

From Cape Borda to Bell Point, a rocky point on the southern shore, the coast is sandy, and from Bell Point, red cliffs with small sandy beaches extend westward to Emeriau Point.

Emeriau Point, the western extremity of Pender Bay, is formed by conspicuous light-colored sandstone cliffs 55 feet high, behind which is a well-wooded range of hills.

Chimney Rocks are four rocks situated close northeastward of Emeriau Point; the outer and largest is 44 feet high, and is conspicuous when seen clear of the land.

A depth of 5 fathoms is found at about 800 yards northward of Chimney Rocks.

Perpendicular Head is a red perpendicular cliff, 69 feet high, situated 1.8 miles eastward of Emeriau Point.

The southern shore of Pender Bay has foul ground, drying in places, extending from it to a distance of nearly 1 mile from Bell Point, and 500 yards from Perpendicular Head.

Woodhouse Rocks, the outer dangers in Pender Bay, are four rocks, which dry, on a coral ridge which extends in a northward and southward direction; the northern and largest rock dries 9 feet, and is situated 3.3 miles southwestward of Cape Borda. The three other rocks are 1,500 yards from the northern rock and dry 7 feet.

Tides.—High-water interval at Pender Bay is 11h. 40m; mean range 13 feet 6 inches, spring range 20 feet 6 inches. The highest tide is the fifth after full and change.

Anchorage.—Good anchorage, in about 4 fathoms, can be obtained in Pender Bay with Chimney Rocks in range with (or just shut in) Perpendicular Head, bearing 282° about 1 mile from that head.

6-7 Coast.—From Emeriau Point the coast trends in a southwestward direction for 4.5 miles to North Head of Beagle Bay, and is formed by low dark cliffs and sandy bays, fronted by rocks, many of which uncover at low water.

Tappers Inlet, situated 1.5 miles northward of North Head, dries at low water; its southern part affords a secure position for small vessels requiring repairs, and good fresh water can be obtained from wells on the sandy islet situated there.

The entrance is liable to shift in position.

6-8 Beagle Bay (*plan on H. O. Chart 3420*) is about 7 miles in length by 4 miles in breadth, with a depth of $6\frac{1}{2}$ fathoms in the entrance abreast North Head, decreasing to 3 fathoms abreast Ledge Point.

North Head is a low dark colored cliff, with a stony hummock on top, 53 feet high, and from which a ridge of grassy hummocks extends northward and eastward about half way to Tappers Inlet.

The low coast thence trends about southward for nearly 8 miles to the head of the bay, where two creeks empty themselves; the northern appeared of no great length and

very narrow, the southern or main creek was navigable for small craft upwards of 10 miles at high water. Both creeks are fringed with mangroves.

Tooker Point, the northern point of Alligator Creek, on the southwestern side of the bay, is about 25 feet high, and from it a grassy-topped ridge of sandy hillocks extends along the shore to the northwestward.

South Head.—Sandy Point, the southwestern point of the entrance to the bay, is composed of sand hills, with their tops and inshore slopes sparsely covered with bush. Sandy Point, the extremity, is 20 feet high, and 1,200 yards within it is a sand hill named South Head, 48 feet high. Several sunken rocks extend off the point; the outer, with a depth of 5 feet, lies 349° 1 mile from it; sunken rocks extend in a northeasterly direction from the same point for a distance of 1,400 yards, having as little as 6 feet of water over them.

Care is necessary in approaching Sandy Point, as both currents set directly across the shallow ground, forming a tide rip.

Anchorage.—Good anchorage may be found on either side of the bay, according to the direction of the wind and the draft of the vessel. Although open to the northwestward, strong winds are seldom experienced from that quarter, and on rare occasions when they do blow last a few hours only.

Landing.—The best landing place under ordinary circumstances is on the sandy beach northward or southward, according to direction of wind, of the Mangrove Ledge, abreast of the Observation Spot, located about 5 miles south-southeastward of North Head. There is also good landing at high water within Cliff Point, farther northward. There is a Roman Catholic settlement with numerous buildings, and also a pearling station, in Beagle Bay.

Water can be obtained at the head of the bay from holes, on the southern entrance point of the southern creek, where casks can be conveniently filled and rolled down to the beach.

Tidal currents.—The velocity of the currents in Beagle Bay is from $\frac{1}{2}$ to $1\frac{1}{2}$ knots.

6-9 OUTLYING ISLANDS AND DANGERS (*H.O. Chart 3420*).—Westward of Beagle Bay, the 10-fathom curve extends westward for about 40 miles, embracing the Lacepede Islands, Baleine Bank, and surrounding dangers.

Eclipse Shoals, of sand and coral, with depths of 4 to 5 fathoms, occupy a space about $3\frac{1}{2}$ miles long in a northwestward and southeastward direction, and from 1 to 1.5 miles wide; these shoals are situated about 7 miles westward of Sandy Point of Beagle Bay, between it and the Lacepede Islands, and almost join the shoal extending from Baldwin Creek to the southward.

Sloper Shoal ($16^{\circ}52'$ S., $122^{\circ}19'$ E.), a narrow coral ridge 1,000 yards long in a northwestward and southeastward direction within the 5-fathom curve, has a least depth of $3\frac{1}{2}$ fathoms, and is situated northwestward of Eclipse Shoals from which it is separated by a channel 1.8 miles broad, with a depth of $5\frac{1}{4}$ fathoms.

6-10 Lacepede Islands are a group of four low islands, composed of sand and coral, covered with coarse grass and short scrub, and nearly surrounded by a coral reef, about 10 miles in length, which dries at low water, and is marked at high water by heavy breakers on the southern edge.

6-11 West Islet ($16^{\circ}51'$ S., $122^{\circ}06'$ E.), the largest and highest of the group, is 22 feet high at the eastern end, 2 miles long in an eastward and westward direction, and from 200 to 600 yards wide; it is separated from Middle Island by a channel 150 yards

★ (7479) AUSTRALIA—Northwest coast—Lacepede Islands—Shoal area reported westward.—An unexamined shoal patch has been reported in 16°50.7' S., 121°54.2' E. with pinnacles of 3 to 5 fathoms extending 1½ miles northwestward.

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H.O. Charts 3420, 3419, 3416.

H.O. Pub. 74, 1952, page 214.

wide, with depths of from 3 feet to $2\frac{3}{4}$ fathoms, locally known as The Pool.

The tidal currents run with great velocity through this channel, but in fine weather, when the southern edge of the reef on which the islands stand is uncovered, it affords a convenient boat anchorage.

Danger Rocks, with depths of 3 to 5 feet, are situated at the edge of the foul ground extending 2.5 miles westward of West Islet, and lie 262° 2.3 miles from the western extremity of that islet. Patches of $2\frac{1}{2}$ and 3 fathoms lie about 1,000 yards southwestward of them. A sunken rock lies about $1\frac{3}{4}$ miles southwestward of the western extremity of West Islet.

6-12 Middle Island, 5 feet high, is 1 mile long in an eastward and westward direction, and 700 yards wide; a break in the surrounding reef gives access to boats on the northern side.

There were deposits of guano on this island.

A patch of 5 fathoms, with 6 to 8 fathoms around it, lies 073° 5 miles from the eastern extremity of Middle Island.

Sandy Islet, 13 feet high, is a small islet situated 2 miles southeastward of Middle Island.

East Islet, 6 feet high, is about 200 yards in diameter, and situated 2 miles southeastward of Sandy Islet.

6-13 Surprise Reef (*H. O. Chart 3420*), of sand and coral, is 2.8 miles long within the 5-fathom curve, in an eastward and westward direction, and from 400 to 1,000 yards broad; the least known depth is $1\frac{1}{4}$ fathoms, which breaks occasionally at low water, and is situated about the center of the reef.

Its eastern extremity, 3 fathoms, lies 195° 4 miles from East Islet.

A patch of $4\frac{1}{2}$ fathoms is situated 4.5 miles 067° from East Islet, or in the direction of Sloper Shoal.

Anchorage.—The best position for small vessels to anchor off the Lacepede Islands is with the eastern extremity of West Islet bearing 171° , distant $1\frac{1}{4}$ miles, in depths of $4\frac{1}{2}$ fathoms, but as the bottom in this vicinity is uneven, vessels with a draft of 18 feet should anchor farther eastward.

Northeasterly winds are accompanied at times by a heavy sea.

Tides.—It is high water, full and change, at Lacepede Islands, at 11h. 27m.; springs rise 20 feet 6 inches, neaps 13 feet 6 inches.

At the anchorage the flood current sets southeastward and the ebb northwestward; at springs in Lacepede Channel these currents attain a velocity of $1\frac{3}{4}$ knots.

Supplies.—Turtle are numerous in the season, and during March and April the islands form the breeding places for several species of sea birds.

Water.—No fresh water is procurable.

6-14 Baleine Bank, composed of sand and coral, extends, within the 10-fathom curve, about $16\frac{1}{2}$ miles west-northwestward from the western end of West Islet. The bank, 3 to 5 miles wide has general depths of 2 to 5 fathoms.

The edges of this bank are generally well marked by tide rippings, but the water over the bank is usually so discolored that it is difficult to detect the shoalest spots, and other rocks may exist than those charted.

6-15 Robber Rocks ($16^{\circ}47' S.$, $122^{\circ}01' E.$), a narrow ridge 500 yards long, with a depth of 5 feet, is situated near the northern edge of Baleine Bank, at 5.8 miles 314° from the western extremity of West Islet.

From Robber Rocks patches of $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms extend 3.5 miles eastward and 2 miles westward.

A narrow ridge, with a least depth of 2 fathoms, is situated 2 miles 243° from Robber Rocks.

Weston Patch is a narrow ridge with a depth of $2\frac{1}{2}$ fathoms, situated on the northern edge of the bank at 1.8 miles 029° from Robber Rocks. A patch of $4\frac{3}{4}$ fathoms lies about 4.5 miles 095° from Weston Patch.

A patch of 3 fathoms lies within the 5-fathom curve at 9 miles 286° from Robber Rocks; the edge of the 5-fathom curve is 1 mile westward of this patch.

A patch of 7 fathoms, with from 13 to 15 fathoms at a short distance, lies 280° 23.5 miles from Robber Rocks.

Depths of 19 and 20 fathoms are charted, respectively, about 27 miles north-northwestward and 28 miles northwestward of Robber Rocks. Depths of under 20 fathoms extend up to a distance of about 24 miles west-northwestward from the western end of Baleine Bank.

Walker Rock, with a depth of 4 fathoms, and 6 to 7 fathoms, around, lies on a partly surveyed bank, 267° 16.5 miles from West Islet of the Lacepede Group.

6-16 COAST.—**Camp Inlet** ($16^{\circ}55' S.$, $122^{\circ}28' E.$, *H. O. Chart 3599*) is a shallow creek, nearly dry at low water, situated 3 miles southward of Beagle Bay, the intervening coast being low and sandy.

The entrance to the inlet is dry at low water, and situated close westward of the ledge extending from Sandy Point.

From Camp Inlet, southward of Beagle Bay, the coast for about 10 miles trends in a southwesterly direction and is low, being backed by parallel ridges of sandy hillocks with bushes from 20 to 66 feet high; it then rises to more conspicuous reddish sand cliffs, which extend with but little break to Cape Baskerville.

6-17 Baldwin Creek ($17^{\circ}01' S.$, $122^{\circ}22' E.$), at 9 miles northeastward of Cape Baskerville, is situated eastward of Low Sandy

Point; it affords good shelter for small vessels lying aground.

A sandy spit, dry at low water, extends 1,800 yards northwestward from Low Sandy Point, and shoal water, with depths of less than 3 fathoms, is found for a distance of $3\frac{1}{2}$ miles northward of that point.

Coast.—Between Baldwin Creek and Cape Baskerville the coast is fronted by rocky ledges, extending from 1,000 yards to 1 mile from it; foul ground extends 4 miles from the western part of this coast.

Red Bluff, situated 3.5 miles southwestward of Baldwin Creek, is a conspicuous red cliff surmounted by a square-topped sand hill, 146 feet high, covered with grass and scrubs.

Tides.—It is high water, full and change, at Red Bluff, at 11h. 36m.; springs rise 20 feet 6 inches, neaps 13 feet 6 inches.

6-18 Cape Baskerville is a sandy cape with a narrow sand spit extending about 2.5 miles westward from it, and a conspicuous sand hill 126 feet high close within it.

The sand hills within Cape Baskerville are 165 feet high, and higher than those to the southward.

Kings Peaks.—At about 6 miles inland from Cape Baskerville rises a wooded range of hills, on the northern part of which are situated two conspicuous peaks, surmounted by bushes resembling boulders, known as Kings Peaks, about 3.5 miles apart in an east and west direction, 278 feet and 253 feet high, respectively.

Tangier Shoals, situated on the outer part of the foul ground, extending from the coast northeastward of Cape Baskerville, are 4 miles long in a north-northeastward and south-southwestward direction; several rocks, with less than 6 feet, are situated on these shoals and a rock, awash at low water, marks the western edge.

Awong Patch, of 3 fathoms, lies in the fairway of Lacepede Channel, 2.3 miles

northward of Tangier Shoal, with Cape Baskerville Hill, 126 feet, bearing 178° , 7.8 miles. Two 5-fathom patches lie $1\frac{1}{2}$ and 2 miles southwestward of Awong Patch.

A patch of $4\frac{1}{2}$ fathoms, lies 800 yards northeastward of it.

Panton Shoals, upon which are several rocks, several of which dry from 2 to 6 feet, extend 5.5 miles westward from Cape Baskerville; the outer rock, awash at low water, is situated 5.3 miles 261° from that cape on the eastern extremity of a detached shoal 1,000 yards in extent, with depths under 3 fathoms.

A shoal of $4\frac{3}{4}$ fathoms is situated 3 miles 253° from the outer patch of Panton Shoals. Patches of 5 fathoms lie southward of it. There are several 5-fathom patches within a distance of 7 miles southward of this shoal.

6-19 Baskerville Shoal, with depths of from $1\frac{1}{4}$ to 5 fathoms, sand and coral bottom, is of irregular shape, occupying a space within the 5 fathom curve, 3.5 miles long and 2 miles wide.

The least depth of $1\frac{1}{4}$ fathoms is situated near the western edge at 7.2 miles 297° from Cape Baskerville Hill 126 feet high.

A channel, 1.7 miles broad, but which is not recommended, separates Baskerville and Tangier Shoals.

6-20 Lacepede Channel, between Lacepede Islands and the mainland, is 10 miles wide, but the navigable portion is reduced to a breadth of about 5 miles, with Awong Patch on the eastern side of the recommended channel; it has depths of 6 to 9 fathoms.

Directions.—Vessels approaching Lacepede Channel from the northward should shape course to pass midway between Sloper and Eclipse Shoals, with a good lookout aloft, thence in midchannel between Awong Patch and the shoal ground extending southward from Lacepede Islands and midway be-

tween Surprise Reef and Baskerville Shoal, afterwards steering to pass well outside Talboys Rock.

The channel between Sloper Shoal and the Lacepede Islands is 5.5 miles wide, with general depths of 6 to 9 fathoms; there is a fairway patch of $4\frac{1}{2}$ fathoms.

6-21 Carnot Bay lies between Cape Baskerville and the low point 4 miles southwestward of it. Within the cape the shores of the bight consist of flat swampy country intersected by creeks; in the northeastern corner is a creek, stated by pearling vessels to be available for small craft at high water.

The whole of the bay dries from 4 to 9 feet at low water for nearly 3 miles beyond Cape Baskerville, outside which are the Panton Shoals.

6-22 Cape Bertholet ($17^{\circ}15' S.$, $122^{\circ}11' E.$, *H. O. Chart 3599*), 8 miles south-southwestward of Cape Baskerville, is an ill-defined point situated at the southern end of a ridge of white sand hills, the southern of which is 54 feet high, and has a small bush on the summit.

Rocks, with less than 6 feet of water, lie 284° , 1.6 miles from the cape.

A reef, which dries 2 feet, lies about 1 mile northward of the cape, with other patches which dry between it and Carnot Bay.

6-23 Coulomb Point—Shoal.—From Cape Bertholet, the sandy coast, backed by sand hills partly covered by scrub, trends southward for 7 miles to Coulomb Point, and is fronted by foul ground extending at one point 3 miles from the shore, with rocks on it drying at low water in places.

A sharp-topped sand hill, 97 feet high, and covered with scrub, is situated 1,500 yards southward of Coulomb Point.

Talboys Rock, a small coral patch of 2 fathoms, generally well marked by tide ripples, is situated 7.5 miles 296° from Coulomb Point.

Patch.—A tongue of the 5-fathom curve extends 6.5 miles northwestward of Coulomb Point and 5 miles westward of it. A patch of $3\frac{1}{4}$ fathoms lies near its edge, bearing from Coulomb Point 300° 6.1 miles, and 1.8 miles eastward of Talboys Rock, with depths of 9 fathoms between. Several patches of 5 fathoms lie outside the 5-fathom curve both northward and southward of the $3\frac{1}{4}$ -fathom patch.

6-24 Aspect—Coast.—From Coulomb Point the sandy coast, backed by white sand hills, extends 2.5 miles to the southward, when red cliffs rise and form the coast line for 5.5 miles to James Price Point.

These red cliffs are from 26 to 80 feet high, and form the only conspicuous feature on this part of the coast.

The coast range of hills at about 10 miles inland between Coulomb Point and James Price Point attains a height of 400 feet, and appears to be well wooded.

Rocks which dry at various stages of the tide, and many sunken rocks front the shore to a distance of 1 mile in places, but all within the 3-fathom curve, which lies up to $1\frac{3}{4}$ miles offshore.

6-25 James Price Point is a low cliffy point backed by a fairly conspicuous group of sand hills, 87 feet high, and partially covered with scrub.

Tides.—Between Cape Leveque and James Price Point the tidal currents in the offing are rotary; when the tide begins to rise the current sets a little eastward of south, gradually turning through the eastward as the water rises and at high water sets between northeast and north.

James Price Patches consist of a chain of shoals, sand and coral bottom, with less than 5 fathoms of water over them at low-water ordinary springs. They lie about 2 miles offshore, and extend for 3 miles in a northerly and southerly direction. The shoalest part,

which has a depth of 24 feet over it at low-water ordinary springs, is on the northern patch, and is situated 2.3 miles 285° from James Price Point summit.

6-26 Coast.—The coast between James Price Point and Cape Boileau consists of sandy beaches interspersed with low cliffs backed by a range of sand hills from 90 to 40 feet in height and partly covered with scrub. The land immediately behind these sand hills is low and covered with bushes, and gradually rises to the southern slopes of the coast range, the summit of which, 400 feet in height, is situated to the northeastward of James Price Point.

6-27 Cape Boileau.—The southern extremity of a conspicuous red cliff, from 10 to 20 feet high and 1.5 miles in length, lies 10.7 miles to the southward of James Price Point.

Grey Shoal.—A small shoal, with a least depth of 5 fathoms of water over it at low-water ordinary springs, sand and coral bottom, and surrounded by depths of 10 to 12 fathoms, is situated 10.9 miles 212° from James Price Point.

Naringla Shoal.—A shoal of small extent, with a least depth of 26 feet over it at low-water ordinary springs, sand and coral bottom, and surrounded by depths of 6 to 7 fathoms, is situated 4.3 miles 260° from the southern extremity of Cape Boileau.

Farm Shoal.—A shoal of sand and coral, with a least depth of 16 feet of water over it at low-water ordinary springs, lies 2 miles 330° from the southern extremity of Cape Boileau. It extends for 1,000 yards in a northwestward and southeastward direction, and is about 400 yards wide.

6-28 Boileau Patches.—A cluster of shoals, with less than 5 fathoms of water over them at low-water ordinary springs, which lie about 1.5 miles westward from Cape Boileau, and extend for 1.5 miles in a